

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

No. 1947.—VOL. XLII.]

LONDON, SATURDAY, DECEMBER 14, 1872.

{ PRICE.....FIVEPENCE!
{ PER ANNUM, BY POST, £1 4s.

Original Correspondence.

THE MINES AND WORKS OF GERMANY.—No. VII. IRON SMELTING IN THE ERZGEBIRGE.

"When Virgil was chanting his pastoral lays in sunny Italy, and great Caesar was thundering in war" amidst the barbarous tribes of Britain, Saxony was the home and centre of all that was known and practised of the art of smelting ores in those early times. Buried in the mountain districts of central Europe, the Bohemians and the Saxons have sought, in the pursuit of mining and metallurgy, that arena for the exercise of their powers which other nations have found in political convulsions, or in military conquest. Iron smelting was carried on here, in a rude and barbarous fashion, as early as in the fourth and fifth centuries before Christ; and Caesar speaks of the swords manufactured in these forests as a well-known production, and one highly appreciated by the uninvincible Romans.

At first the attempts were rude and simple. A few stones enclosed a small circular space on the hill side; the neighbouring wood supplied the fuel, and the winds of heaven the blast. Next, a small hearth was constructed, 3 or 4 ft. high, blown by great skin bellows, worked by hand. Then enlarged hearths were invented, known as *stockofens*, and the large bellows were worked by water-wheels; and, lastly, the modern furnace, with all the aids and methods perfected in the nineteenth century. The South Germans have been all along the pioneers of European metallurgy. It was, therefore, with something more than commercial interest that we visited the famous seat of the Saxon iron smelting. Every town, every process, custom, and phrase in the German iron trade abounds in historical interest.

Through the courtesy of Herr Buschmann, of Zwickau, we were introduced to the manager of the ironworks in the immediate neighbourhood, and were received with the utmost urbanity, and at once allowed every facility of inspection.

The first point that struck our attention was the large variety in the ironstone used. Six or seven different ores were brought together, to be combined in the furnace, much on the same principle as our spirit merchants make their famous blends. The quality of the pig-iron, we were assured, was just the sum of the qualities known to result from the use of each ore separately; and that the furnace manager, himself a thoroughly practical chemist, varied the ingredients from time to time, according to the required quality of the iron. The pigs being intended for consumption on the spot, and by the same firm, the ore mixtures in the furnace were effected with a direct reference to the object to be served by the finished iron, and were, to this end, controlled to the greatest nicety. Though these principles of mixing ores are admitted in England, and to some extent acted upon, the subject is far from receiving that amount of attention which it merits. The different ores actually in use on the day of our visit were the following:—

1. A sesqui oxide, somewhat resembling our Oxford ore, but containing few, if any, fossil remains. It is obtained from mines in the Thuringian forest, some 30 miles away, and brought here by rail. It yields on analysis 45 per cent. of iron.

2. A clay carbonate of iron, called *schwartzaber*, and containing 35 per cent. of iron.

3. Spherosiderite, a most valuable ore of iron, found in the Saxon coal measures. This mineral is found in nodules, most of them having in their centres organic remains. Neuropteris and pectopteris seemed the most common. From its external appearance, and the character of its fossils, this ore has a remarkable resemblance to the celebrated blue flints ironstone of the South Staffordshire coal field. On analysis it yields 65 per cent. of metal, and also traces of ferrocyanide of potassium, which is supposed to exert a favourable influence on the hardness of the iron.

4. A red hematite, darker in colour, but similar in composition and yield of metal, to the Ulverstone ironstone.

The furnaces were at that time producing their common iron. The flux was lime, containing a little fluor-spar, and also a small quantity of calcareous phosphate. This lime being found near, is cheap, but on account of the phosphorus is only used for the common class of iron, whilst a purer variety is employed for the better brands. In the common iron the phosphorus amounts to 0.15 per cent., which is a most injurious amount. There are three furnaces, connected together by a solid mass of brickwork. They are square at the bottom, and slightly tapering up to 20 ft. high. The total height is 58 ft., the breadth being somewhat greater than in the best modern models. The usual form of hoist is employed to elevate the materials to the furnace top; and we observed each barrow load, about 1½ cwt., was itself an intimate mixture of ores, flux, and coke, and not, as is the case very often in this country, consisting of ore, lime, &c., sent up in separate barrows, and tumbled into the furnace to mix as well as they can. The ordinary U-pipes are in operation to heat the blast. The engine is beautifully got up. It consists of two cylinders, of 43 in., and it is worked at 150-horse power. It was built at Schemnitz.

Some of the lighter work is here performed by women; about 50 are employed. They break the lime, mix the ores, fill the barrows, &c., and receive two-thirds the wages of the men. The ironstone is calcined in close furnaces, and some of the ores are roasted separately; but throughout every operation the utmost care is taken to ensure perfect homogeneity in the mixtures. They tap every 12 hours, and produce 50 to 60 tons of pig-iron at each casting. These furnaces have been in operation nearly 20 years, and are not considered by the proprietors by any means faultless in their construction; and already they contemplate the erection of others, over 70 ft. high, similar to the recent erections in Belgium and the North of England. But we return to our hotel at Zwickau, thoroughly convinced that in point of the selection and careful combination of the furnace materials, and in the eminent scientific and metallurgical ability displayed in the management, our English blast-furnaces might be sensibly benefitted by the adoption of the practices of the Saxon iron smelters.

As a specimen of a low furnace, vigorously conducted on modern principles, we visited a blast-furnace in Belgium, near Liège. These works are situated at Ougre, close to Seraing. They are built on the principle of the old charcoal furnace. The hearth is very small, and the height not quite 40 ft.; but the quality of the iron is second

to none in the market. Their great success seems to us to be chiefly due to the fact that the ore used—a sesqui oxide of iron—contains an intimate admixture of carbonaceous matter, giving it a dark colour, and greatly facilitating its reduction. The ore, locally known as "minett," is mined in the provinces of Luxembourg and Nassau, and is brought down the river in barges. A suitable lime for flux is found near the works. The hot-blast is used, and the fuel is coke. A charge is tapped every eight hours, thus giving three castings per day, which more than makes up for the deficient capacity of the furnaces. The works are now carried on by a company, for whom Herr Schmidt, a German, is managing director. They are said to turn out the finest brand of iron in all Belgium. This natural mixture of carbon in the ironstone is the main cause of its easier reduction, and this it is which makes it admit of being so short a time in the furnace. It also effects the carbonisation of the iron in the furnace nearly as well as though the fuel had been charcoal. In all these features it bears a strong resemblance to the famous blackband ironstone, which has earned so just a celebrity for Scotch iron.

Our visit to the extensive ironworks of Marienhütte, carried on by the Saxon Government, we purpose to describe in our next.

MANUFACTURING OPERATIONS IN GLAMORGANSHIRE.

(From an occasional Correspondent.)

PONTYPRIDD is the centre of a rapidly advancing district, and the variety of trade and manufacture carried on therein places it in a condition of good general prosperity. The blowing-in of the first furnace of the works now possessed by the Forest Iron and Steel Company, and the forward condition of the second, introduces another branch of industry into the neighbourhood; and when the whole contemplated establishment of this company is erected, and in full work, it will vastly enhance the value of property therein, and promote that general prosperity which variety of manufacture always ensures.

The site occupied by the Forest Company's furnaces, &c., is very favourable for the laying out of extensive works, and it is closely adjoining the Taff Vale Railway. The Glamorganshire Canal is also in close proximity, and the former proprietors of these (then unfinished) works had a connection with the canal in constant use. There has also been a talk of a branch railway from off the Rhymney Railway, near Caerphilly, to Pontypridd, which branch would pass near to these works, and form a very important link between the latter place (including the Rhondda district) and Newport, and, at the same time, with the London and North-Western and Midland Railways, through the Rhymney, and Brecon and Merthyr Railways respectively. There can be no doubt that such an additional outlet for this district would cause great good to all connected with its trade, and also place the freighters thereof in a much better position than they can otherwise attain.

The new colliery workings that are now being proceeded with on the west side of Pontypridd, by Messrs. Fowler and Co., are also likely to become a marked feature, and a source of much prosperity to the district; and already the question of building a large number of new cottages for the workmen who, it is expected, will be shortly employed in these collieries, is being talked of. With a good coal secured, these workings should become very valuable, as they occupy so good a position in regard to their proximity to market, being only about 12 miles from Cardiff.

The Chain and Anchor Works of Messrs. Brown, Lenox, and Co. are also doing a good trade, and are the source of much prosperity to the district. Under the energetic management of Mr. Penn, every effort is being made to ensure the best results possible.

There is also the Forest Tin-Plate Works, in the full flow of steady and profitable working. These works are exceedingly well laid out, and were erected by the former proprietor, Mr. Francis Crawshaw, in his characteristic style, embodying sound and substantial workmanship to the fullest extent. The present proprietors, who are lessees holding from Mr. Crawshaw, have added the making of sulphuric acid to the other operations carried on; and everything is being done to ensure economical working; and the utilisation of the products of the "wash-house" by Pugsley's patent process is also in operation here.

Then, again, we have the Taff Vale Rails Works, the property of Mr. Richard Fothergill, M.P., which have for a long time been carried on with great regularity; but there seems to be now some little difficulty in ensuring a sufficient supply of fuel with which to carry on full operations. An enlargement of these works is also spoken of, which, if carried out, cannot but largely promote the accession of prosperity to the district.

In addition to the foregoing there are also the Coedpenmain Foundry and Engine Works, the Chemical and Vinegar Works of the Messrs. Chivers, Todd, and Co., the Chemical Works of Mrs. Smith, and the collieries of Mr. R. Rowlands. All these are within the immediate district of which Pontypridd forms the centre; and seeing that some of them are just in their infancy, and others in process of being largely developed, there cannot be a doubt that in a few years the population will be very much larger than it is at the present time.

With these accessions to its material prosperity it may fairly be hoped that the district will be found to be possessed of men who will push on the supply of the educational necessities of the district. These have hitherto been of a most meagre type, and particularly insufficient in quantity; but at last a science and art class has been set-a-going, and for the good of the community it may be hoped that the movement may have a prosperous future. Where the manufactures of a district are so varied, as are those of that of which Pontypridd forms the centre, it must be a matter of the utmost importance that the youths therein should be instructed, in some measure, in the science of their respective arts, and so be taught to seek (and in seeking certainly in some measure to find) pleasure in the performance of their daily allotted tasks, as well as to find therein their source of temporal sustenance. It is only when the mind is engaged as well as the hands, when there is a disposition to find a pleasure as well as a profit in the daily toil, that the whole manhood becomes exerted and developed, and the employer and employed derive the full benefit of their mutual connection.

There are men now connected with the trade of the district who are eminent for their scientific attainments, and who have in other

places shown themselves the generous patrons of educational efforts. Let us hope that the district, in this respect also, may be found reaping a benefit from its extended and new connections.

METALLIFEROUS MINES REGULATION ACT.

SIR,—Will you be kind enough to state whether Managers falling under the above Act, are required to hold Certificates equally with Managers falling under the Coal Mines Regulation Act?

Dec. 10.

HEMATITE.

[The Managers of mines falling under this Act are not required to hold a certificate of competency. The classes of mines which do and which do not come under the Coal Mines Regulation Act (according to the Secretary of State's opinion) were stated in last week's Journal.]

THE MINES REGULATION ACT.

SIR,—My attention has been called to a letter which appeared in the Supplement to last week's *Mining Journal*, signed by Mr. W. Stewart, Chairman of the Committee of Yorkshire Coalowners, in which he states that you have been misinformed as to the opinion of the Inspector of Mines for Yorkshire as "to the persons who are to receive certificates as Managers under the Act." The information furnished to you was that the underviewers—those, in fact, in whose hands the entire management of the underground workings were placed—were the parties who were to receive certificates, or be examined for them. Mr. Stewart, whilst denying the statement, does not enlighten us any further. Why he does not do so is, of course, best known to himself. However, a few days since I forwarded a letter to Mr. Wardell, the Inspector, asking whether the first statement was correct or not, but he has not thought well to answer it, although I believe it is usual for Inspectors, who are gentlemen in every sense of the word, to answer letters addressed to them in courteous terms. So, despite Mr. Stewart's assertion to the contrary, I still consider the statement in your article to be substantially correct. If it is not, then most of the leading underviewers in South Yorkshire are labouring under a very serious mistake, and which no time should be lost in correcting.

J. RUGLEN.

Barnsley, Dec. 11.

COAL MINES REGULATION ACT, 1872.

CERTIFICATES OF SERVICE.

SIR,—It would appear that this complicated question is now settled by the decision of the Secretary of State's communication to the several Inspectors, which, as Mr. Hall observes, tallies very closely with his forecast, and also the opinions given by the Inspectors in conference with the Lancashire and Cheshire Coal Association in Manchester a few weeks ago, and also as given by you in your article of Nov. 30. as the views of Mr. Wardell, the Inspector, that the certificated manager will be the underviewer who has charge and control of the colliery workings—those are, in my opinion, the class of men intended by the Act to be managers, and they are also the proper men to fill the office. But I see by this week's Journal Mr. Stewart, of Wakefield, Chairman of the Committee of Coalowners, states, on behalf of that committee, that you have been misinformed as to Mr. Wardell's views. I see you had very properly left out that broad term "viewer," which you, in your article of this week, give as the Secretary of State's decision, that certificates of service will be granted to "viewers" as well as underviewers. This I consider a very wide term, and, speaking generally, means a mine agent, a mining engineer, a consulting engineer, almost any gentleman having in any way the least connection with a mining engineer's office if you like, who, by obtaining a certificate for one colliery, or half-a-dozen collieries, becomes manager for each, and the present staff of foremen, underlookers, deputies, or underground overmen, who have, perhaps, for years been trying to raise themselves by their own exertions, must become his "competent persons," and he can sit in his office if he thinks proper, and those "competent persons" manage the work for him; should anything go wrong, of course the responsibility goes with the holders of the certificate, and also the owner and agent (if any), unless he, the "manager," proves that he had taken all reasonable means by publishing, and to the best of his power enforcing, the rules, as regulations for the working of the mine, so as to prevent such contravention or non-compliance. Now, this is one of the easiest things possible for a gentleman-manager to do, according to the latest version of the several terms of the Act.

I will give you my views, Mr. Editor, how I think this so far difficult question might be got over, and leave things almost as they are at present, so long as the Act holds the owner, agent, and manager all three responsible to the same extent, and gives power to the owner to be manager if he likes, and Mr. Hall tells us, in his letter in the Journal, Oct. 22 "To the conduct of a mine the Act does not render an agent in any way needful, but only subjects him, if he exists, to certain obligations and liabilities;" and the same author also shows us he cannot exist if the owner becomes manager, and as the words "constant supervision" in the Act is said not to mean constant daily inspection, it must leave it open to the manager to go into the mine when he thinks proper—either once a week, once a month, or once in three months; only the "competent persons" must go see him if he does not go see them. Under these circumstances, why not all owners take the certificate? he can then retain his present staff of officials, who will, by the Act, become his "competent persons," instead of, as at present, his steward, deputies, agent, &c., and he alone, as manager, will be subject to the obligations.

MINER.

MINERAL RIGHTS IN THE FOREST OF DEAN.

SIR,—No man with a press of business on his hands would think of throwing away precious time and occupying the space in your valuable Journal in endeavouring to enlighten the public upon nothing; and we consider it a great pity if "Forester" knew anything of the case alluded to that he did not state it. There has, however, always been, and still are, to be found idle meddlers in every matter. But perhaps your correspondent is still "out of court upon it;" and he would have been far wiser to have remained in the background, his proper place; and we trust in future, if he is capable of discriminating between right and wrong, that he will occupy himself

with a more worthy cause than to attempt to back up those who unjustly set up claims in order to gratify a morbid and grasping disposition. If "Forester" should again show himself in print (which for his own sake we should certainly recommend him to do) we should suggest to him the propriety of confining himself not to any arguments he may advance which are based upon assumption, but to facts themselves; and if he has forgotten what was stated at the Gavel's office perhaps he is sufficiently acquainted with that office to get his memory refreshed by enquiries made through the present Crown officials. Is he sufficiently known there, and has he confidence in himself for this? "Forester" would no doubt gain credit and applause to himself if he were to lavish his unappreciated praise upon the high sounding "Forester Horn," trumpeting, as it does, the story of aggrandisement covered up by a mantle of untruths. If "Forester" desires to become champion at the recommendation of the Messrs. Brain, by all means let him show himself boldly and truthfully; and then, if it would not militate against him to print his signature, we shall be happy to present ourselves on equal terms.

ONE WHO KNOWS.

GUNPOWDER, LITHOFRACTEUR, AND PUDROLYTHE.

SIR.—I observe a letter from Mr. Twynam in last week's Journal speaking in favour of Pudrolythe. Gun-Cotton has been introduced into our mines as a substitute for gunpowder without coming into permanent use. I shall be glad to learn from those who have had opportunities of judging of the relative merits of the explosives named at the head of this letter, whether Lithofracteur and Pudrolythe are as safe agents for blasting in mines as gunpowder in the hands of ordinary miners? Do the new explosives produce little smoke as compared with gunpowder, as this is an important element to deal with in the Cleveland ironstone mines—to get rid of the smoke? An explosive producing little smoke and as safe as gunpowder is what is required. There seems to be no doubt as to the great explosive force of the new compounds.—Dec. 11. C. V.

WORKING IRON FURNACES ON SUNDAYS.

SIR.—In connection with my former communication, in which I propounded the question—"Is there any practical method of working a large iron-smelting furnace by which work can be suspended upon the Sabbath?" I take the liberty of enclosing you a copy of a letter which I received from a gentleman connected with the Ashland Furnace, Kentucky, in which your readers may be interested:—

"Ashland, Kentucky, Nov. 14.—Yours of the 6th inst. is at hand, and contents noted. We stop our furnace, the Ashland, every Sunday. There are some 60 blast-furnaces in this, the Hanging Rock Iron region, using charcoal for fuel. Much more than one-half of these charcoal furnaces are stopped on Sunday. We think the Ashland the only furnace in the world using raw coal which is stopped on Sunday. We believe many furnaces might have been built so as to be stopped, but cannot say that all can be as now constructed.—JOHN MEANS."

I also send you an extract from the *New York Iron Age* bearing upon the question:—

"The Ashland Furnace, at Ashland, Kentucky, is stopped during the 12 hours of daylight on Sunday. Formerly work was suspended for the entire 24 hours, but the workmen prefer the shorter time, for the reason that it gives them daylight to stop and start in. When necessary the furnace is kept in blast during Sunday, but that does not often happen. In a private letter before us the superintendent, Mr. Douglas Putnam, says:—'This furnace has made stopping on Sunday the rule—running the exception—since its blow-in three years last August, excepting a few months during the summer of 1870, when the hearth was very thin or worn. I am of opinion that a stoppage of 12 hours, or during daylight, is not only of no detriment, but is rather an advantage, giving an opportunity of examining all machinery, and with the men rested for the next week's work. We simply stop, make no change in burden, or anything else. The average production of the furnace per day is 40 tons; size 15 by 62. Stock yields about 50 to 55 per cent. During the time we did not stop the furnace worked no better, used no less stock, and averaged no more iron than when we stopped as usual.'"

While much may be said on the negative side, I think, Mr. Editor, that more can be said on the affirmative side than any of us anticipated. I hope, before very long, to obtain important and interesting information bearing upon the question, which it will give me pleasure to communicate to you. In the meanwhile, if you should obtain information upon the subject, I hope you will acquaint me with it.

JOHN C. HENDERSON, JUN.

Broome-street, New York, Nov. 26.

TREATMENT OF COPPER PRECIPITATE.

SIR.—Although many suggestions have been made to utilise poor copper ores in Cornwall, I believe the precipitate obtained has usually been so contaminated with other metals that the merchantable value is much reduced. To overcome this difficulty an invention has been patented by Mr. J. H. Dennis, of Liverpool, which will be of interest to a large number of shareholders in Cornish mines.

I may explain, then, that the object of Mr. Dennis's invention is to purify commercial copper precipitate obtained by the wet way, and also to utilise some of the metallic impurities extracted therefrom. The precipitate is first washed with hot water, to remove soluble salts. If it be desired to wash out sulphate of lead, common salt is added, or the washing are used over and over, until they contain sufficient salt. The precipitate is washed with sulphuric or hydrochloric acid until the solution of sulphate or chloride is of sufficient strength to crystallise. Any copper which may have been dissolved is precipitated. After the treatment described in this and the above first head, the precipitate is sufficiently purified to be at once smelted into metallic copper. Thirdly, should there be sufficient silver to pay for extraction, he oxydises the precipitate after the second operation in a furnace, and afterward dissolves out the silver by hot strong brine or hypo-sulphate of soda, the silver being precipitated by copper, and the copper finally by iron. To produce sulphate of copper he dissolves the oxygen obtained under the above third head in sulphuric acid. The silver and gold, or either silver or gold, remain undissolved.

Now, I am quite ready to admit that there are comparatively few companies (considering the number of failures that are on record with regard to poor copper processes) who would be inclined to undertake the risk of erecting the necessary works, but Mr. Dennis would have no difficulty in finding many who would permit him to put up works and work their poor ores, giving him an agreement to take them at a fixed price upon proof of their capability to yield 5 per cent. net profit for six consecutive months, he taking half the profits earned during the probationary period.

Liverpool, Dec. 7.

RAILWAYS FOR NORTH CORNWALL.

SIR.—Considerable interest has recently been aroused in the minds of the inhabitants of North Cornwall from the fact that the neighbourhood has been the scene of an uncommonly large number of surveyors taking surveys of intended lines of railway. It would appear as if all of a sudden the eyes of those interested in railway traffic in Cornwall and Devon, and also in lines drawing support from these counties, were beginning to open to see the enormous capabilities of the neighbourhood and their consequent requirements, while it would be too much to expect that all the intended schemes would obtain the needful Government sanction, yet it is to be hoped many will. West Devon and North Cornwall have really and truly been neglected as regards railway communication. No doubt one of the leading causes has been the want of capital. But this may not be all. The curse of unreasonable opposition, directly or indirectly, however, has, it is to be feared, done its work too well. May former shortsightedness be set aside, and the commercial telescope be adjusted at the right focus respecting these deserving districts.

The tract of country between Barnstaple and Wadebridge embraces large areas of agricultural and mineral districts, the former very extensive indeed; the latter also extensive, to say nothing of the mineral ground between Wadebridge and Truro. The capabilities of these districts in an agricultural point of view to afford railway traffic are difficult to estimate, but they may safely be put down as great. Relative to the probable supply of traffic from minerals the most sanguine can only guess what a line of railway would open up. That minerals abound over a large portion of the ground is quite clear. The four leading metals of the two western counties—copper, tin, lead, and iron—are known to abound within the bounds of the district. It is equally a fact that large quantities of those minerals must remain unearthened unless the neighbourhoods in which they abound are opened up by railway communication.

In addition to the metals the mineral Slate abounds in immense quantities. Slate and slab rock exists very extensively. But the chief slate formation is in the neighbourhood of Camelford, where the beds cover a great many square miles. This district is best known commercially as the Delabole district, the slates produced from which have a world-wide fame, on account of their superior quality. The source of traffic to a line of railway passing through this neighbourhood from the transit of slate alone could not fail to be an important item. A very large portion of the slates and slabs produced, now obliged to be shipped, would pass over a line of railway did such exist. Slates are carted a distance ranging up to 40 miles from the quarries, at an enormous cost for carriage, the commercial meaning of which is the minimum consumption of the article in such neighbourhoods. The rail, however, banishing distance, and reducing the cost of carriage to a fraction, would scatter those celebrated slabs tenfold, to the no small advantage of the railway companies, and at the same time produce such favourable effects in the slate quarries as to enhance their value very much, and bring them into far greater importance. The like fact is, of course, the more or less applicable to all property in the neighbourhood through which the line passes.

RESIDENT.

QUEENSLAND TIN.

SIR.—The following is an extract from a letter, received last week, from as intelligent a tin miner as ever left St. Just for Australia. Writing from Ballarat, he says—"Bad news from Queensland and Port Darwin; it seems to me that the whole is collapsing altogether, and speculators are doing nothing but losing money." I think you will do right to insert the above in your next paper, as I feel confident the information is reliable.

TIN MINER.

Penzance, Dec. 5.

THE NEW GOLD DISTRICT—ISLAND OF ARUBA.

SIR.—Acquainted with every corner of this island, with its inhabitants, climate, resources, and mineral wealth, a few observations thereon may interest some of your readers. In old charts the name is engraved Oruba. In "La Lingua Papiemto" the pronunciation of the English letter "v" is often assimilated to that of "b," hence Uva is pronounced "Uba," and that of "O" in Oro being shortened, the modern name of Aruba has been substituted for "Oruba," the selection of which, so appropriate to gold fields, was probably made by the early Spaniards after their discoveries. So little was this island generally known that in August, 1869, the British Consul at Point Thomas, with the captain of a vessel of 250 tons, chartered to the island, had great difficulty in obtaining satisfactory evidence there that along the island there was safe anchorage for such a vessel. The currents, or stream, or "strom," as they are called, from E.N.E., under the influence of the trade winds, are very strong, and, therefore, except upon business, there is little inducement to the inhabitants or others to enjoy the beautiful sailing they would otherwise do, and there was little communication with the island.

The first native gold found in the island in modern years (1823) was by a shepherd boy, in stooping to drink in one of the river beds, and for which he obtained some exchange at a store as copper, when gradually the discovery was made, and the Government worked the alluvial gold fields, and very pure and heavy gold was found in the small dry river beds and in alluvial ground. In the first concession which was made of the mineral rights of the islands to the Netherlands, which took effect in 1854, were several obstacles to its adoption in this country, as, if a company was formed in England, a double board was required in the Netherlands, as well as official Netherlands representatives in the colonies; and a further condition was required, that not less than 50 natives should be constantly employed, under penalty of forfeiture of the concession. The Government were likewise entitled to a royalty of 2½ per cent.

In 1867, whilst proofs of the ores were being made in England, with arrangements for the necessary works in the island, a Senor Isola appeared on the ground, never having taken any part in the discoveries, or of the proofs made up to that period, but being encaptured with what he saw of the works of others, waved his wand, and in the euphonious parliamentary language of the celebrated Mr. Disraeli, "whilst the boys were bathing he ran away with the clothes." In the new concession, granted in 1868, the terms were far more liberal, no royalty was required, nor was the company called on to keep employed at all times 50 natives (although now they will probably employ 1000); a yearly part of about 210l. English, 2500 fl. Dutch, was the ground rent. This concession has been confirmed by the Government, and enlarged in favour of the enterprising Americans who acquired it by purchase from Senor Isola, and who have since formed the Aruba Island Gold Mining Company (Limited); but who, notwithstanding proofs made since their acquisition of the property entirely confirming the auriferous character of the country, are possibly not sensible of the real prize they possess. It may, perhaps, be added, though not generally known or remembered, that British subjects are not within the circle of most favoured nations (say Spain for one) to whom the royal and national rights of the Netherlands are accorded, and when such are especially desired John "must be a Dutchman" if he can. All nations will, however, be glad to hear of the good prospects of continuous large supplies of gold from this now additional acknowledged gold field.

A FORMER RESIDENT FOR SOME YEARS ON THE ISLAND.

[In the letter on this subject, in the Supplement to last week's Journal, Jhu Hichins was printed for J. Hichins; it was JOSIAH, not JEHU, who brought out Devon Consols.]

AN AMERICAN'S VIEWS OF THE TIN MINES OF CORNWALL.

SIR.—The rejoinder of Mr. G. W. Baker to my remarks on his former letter to you is an ample acknowledgement of their truthfulness and impregnability of my position, yet, at the same time, is an ingenious though clumsy attempt to palliate a gross error. It is no uncommon thing for men to have recourse to personal abuse when they are driven into a corner, and cut off from all accessibility to facts in argument. If bullying were mining I should have no hesitation in at once acknowledging him my superior; but as it is not, and as I have met with similar treatment before from similar pretenders, I am rather amused than otherwise at the entertainment he has afforded me, in common with your numerous other readers. The present display is no doubt a striking portrait of the man himself—an embodiment of all that he is, and the conclusion of all that he knows of mining. He has evidently to learn that mining in Cornwall is conducted as a business, with a view to the best pecuniary results, prosecuted upon the merits and peculiarities of each individual concern, and is not decorated in fanciful attire, with the gilding made prominent, for ulterior and nefarious purposes.

If the Boscawell Downs Mine is in the condition that Mr. Baker says it is—machinery out of doors, shafts untimbered which should be timbered, and water dripping everywhere from the upper to the lower levels, irrespective of the damage it may do in a soft ground mine as that is reported to be, and the additional expense it may involve in raising the water from greater depths than needs be, together with the ill-condition of their dressing-floors and the demoralised state of their workpeople, as affirmed by Mr. Baker—then I have no hesitation in saying that no one has any right to assume that that mine is a fit representative of the tin mines of Cornwall; and, having said as much, will leave the avowal of such statements to those whom they more immediately concern.

As no facts contained in my letter in the Supplement to the Journal of Nov. 30 have been controverted, I have nothing to do but to dilate on the subject in a general way, and here I may remark that to call ill names in a controversy, or to have recourse, however qualified, to the application of uncomplimentary epithets, may be very fashionable in some quarters, and may there serve to strengthen one side of a disputed position; but it will not do so in this country. As to myself, I never plunge into a dust cloud, especially when I have reason to know that it was purposely raised to bewilder and mislead me; I rather prefer to move in my own normal sphere, beyond its reach, and that of the writer by whose instrumentality it was produced. It would savour of much weakness in me to condescend to a vindication of my knowledge of mining in this country. That is as well known to others as it is to myself; but I have lived in places

where one cannot be credited with what he knows, nor with what he is, and where the practice is common amongst a certain class to augment your own importance by a studied disparagement of others, and where the measure of success attendant upon such practices is looked upon as the proper criterion of business abilities.

What a perversion of ideas and abuse of language is exhibited in Mr. Baker's performance. How ill applied is the Latin phrase, *caecothus scribendi*, to one whose writing was instigated by self-defence, Cornish mining was assailed, and I am an endorser of its principles, and a Cornish man; and, therefore, my defence of Cornish mining was indirectly self-defence. When I first read "An American's Views of Cornish Tin Mining" I regarded them as being merely an escape of a turgid imagination, rendered licentious by over indulgence; but his rejoinder, in last week's Journal, to my strictures of the former week has entirely undeceived me, as by that it is clearly to be seen that he had an ulterior object. His own words are—"As to other improvements to replace the concatenation of fortuitous circumstances now employed in tin washing, some suggestions may be made at the proper time, and to the proper persons." In this paragraph we have the object; and, to prepare the way for its success, the present methods of tin dressing required to be disparaged—that is, to increase the apparent value of one thing another thing in juxtaposition to it must be depreciated. He has also stated, as an apology for the publication of his views of Cornish tin mining, that it was done with the concurrence and approval of some interested in Cornish mines, but in what their interests consist is not stated. It might be by revolutionising a system which would immediately require to be itself superseded by something else.

Mr. Baker does not attempt to controvert my figures as to the money value of a ton of stuff containing 20 lbs. of black tin at 80l. per ton, but evades the point with a flourish, that when he teaches arithmetic he hopes to have gentlemen for his pupils. This probably is a more characteristic remark than he intended it to be. I mean, of course, as to himself, as I am happy to know that no man can be esteemed a gentleman in this country who is not already instructed in the science of mathematics. My opponent accuses me of having written more in my last letter than I knew of mining, but that he has much more to say on the subject. I am very glad that he has, and would like to hear from him, by way of a beginning, what advantage can accrue to mining from the timbering of a shaft which is sufficiently firm without to be self-supporting? And, further, what are the peculiarities and fundamental principles of Cornish tin dressing—two branches of mining which he has specially instanced as faulty at the Boscawell Downs Mine? He also assumes to be very valiant because he can write what he thinks about the habits and customs of the English, and have it published in an English journal, a piece of bravado, by the way, which I esteem as being highly complimentary, not to himself, as he intended, but to the English press. It stimulates my pride to reflect that I am a citizen of a country whose institutions, including the press, are as free in their operation as they are alleged to be in theory. Would that he could say as much for the institutions of America. Perhaps, I cannot do better, as our friend seems to luxuriate in Latin quotations, than to conclude with one; it is both pertinent to the case and applicable to him—*Ab alio expectes, alteri quid feceris.*

ROBERT KNAPP.

Liskeard, Dec. 10.

N. ENNOR'S REMARKS ON THE QUANTITY OF TIN ANNUALLY WASHING DOWN THE RED RIVER.

SIR.—With your permission, I will make a few remarks on Tin Mining and Tin Dressing. I have recently been on a tour of inspection of mines and stamps through Cornwall with a gentleman interested in mines, and like most other sight-seers and freethinkers we strolled over many of the most celebrated tin mines in the county, such as Dolcoath, Tincroft, Cook's Kitchen, North Pool, and many others; in fact, we visited most of the mines situated near the celebrated Red River valley. I may as well at once set it down as a valley glutted with tin. Having heard extraordinary tales respecting the loss of tin from the mines from all the people we met, we wended our way down for about ½ mile through it, and I am bound to admit I was taken by surprise. I observed man's inventive genius had been sorely tried in finding out the best means of working the mines, bringing the poor masses of tinstuff to the surface, and extracting the tin therefrom. These hitherto hidden treasures many men will argue have lain concealed there ever since Adam's creation; but from that view I differ, and I am convinced that all sound practical men of the present day will do the same, knowing as we do that six-sided quartz diamonds have grown long since Adam mouldered in the dust, and on that diamond may be seen cubes of mundic and lead formed on its sides and angles. On some stones as many as six or eight substances may be seen formed on a first base. I cannot suppose that Cornwall now contains a single keen, practical miner who has not come to the conclusion that large portions of the tin and every other ore found in this prolific vale has been formed there long since the Ancient Britons held sway or the Druids had the pre-eminence over and on what are called and supposed to be their own sacred rocks, and which were visible to us on the sides and summits of the surrounding hills. I will not, however, carry this subject further, but leave it in the hands of all freethinkers, with liberty to form their own opinions as to the age of all ores, my opinion having been formed long since, and every day I am strengthened in the belief that there is not a single substance in all creation but is continually changing its position.

Returning, therefore, to the valley, allow me to bring before the notice of the mining interest and the public generally a subject of startling interest, obtained from the best authority I could procure. Grounded thus on well authenticated evidence, I set them down as facts, which are stubborn things to war against. First, I notice the quantity of tin returned by the companies working tin mines in and about this valley is said at a rough estimate to be about 500 tons per annum. This portion is carried into the accounts of the mines to meet expenses and pay dividends. A great number of the mines, however, are only acting as so many lodestones—continually drawing money from well-intentioned shareholders' pockets in the shape of calls, but all men know that legitimate mining in prolific rocks is a paying thing if managed by practical, thinking, and smart agents. But to make them paying ones the agents must stick to their mine like limpets to a rock, and have no other source to get their pay-day from except the ores of the mine. In my day I have seen many mines managed by men called good miners who were quiet and easy, and yet never returned a shilling to the company, whilst the same mine in other and smarter hands would have paid thousands. These quiet and easy men have most of them the knack of writing coaxing reports which draw from the shareholders' pockets what ought to have been used to purchase bread for their children for years after the mine should have been abandoned.

Next, I turn to the rich Red River and analyze it. Into this refuse of many tin mines falls, and tin associates with iron oxides, causing it to be called the "Red River," having exterminated all fish and almost every other living thing in it. Having long heard that tin was washing down to the sea, in our stroll down the valley I questioned many of those we saw working on the spot respecting it. Their answers almost stunned me. One of them told me that 70,000l. worth of tin was annually caught by men who got hold of little slips and corners by the water side, and one lord received over 4000l. a year as dues for only a portion of the stream. I met one keen-eyed practical man, whom I questioned pretty closely, and I drew out from him that he left a situation he had in a large tin mine above and took a corner by the Red River side in preference to being a well paid tin-dresser; he was, however, wide awake, saying they were only fools who informed me, and that he would sell his tin for half what they said he got out. I found on enquiry respecting him that when he commenced catching tin in the valley he stuck to it like a leech, up in time in the morning, jumping into any passing donkey-cart to get there more quickly, but the fruits of the river soon produced him a pony and trap, and now he has a horse, trap, and silver-mounted harness. This is an item in confirmation of the report of the riches which go down the river. I had read to me a portion of the copy of a dues collector's book, showing that 50,000l. worth of tin is yearly caught and prevented from going down this Red River, and from the best authenticated accounts I

get I could come to no other conclusion than that 50,000*l.* worth of tin really is annually caught by these men, recently termed "squatters." The sea beach, too, is said to be now worth 1*l.* per ton. Therefore the nearest calculation I can arrive at is that there is at least 60,000*l.* worth of tin annually sent down this river, which vast sum is lost even to the dividend-paying mineowners; this must fall very heavily on those who are continually paying calls, and is most painful to contemplate.

Now comes the grand question—Are the best means used at the mines to catch or detain a larger portion of the tin? To me it is clear it is not properly handled. I know tin will go down the stream, but it should not go to this extent. Then, what is to be done to catch it? Many persons informed me that there is not a work on the river but one or more of the mine agents above, or their friends, are sharing with the "squatters;" but this I do not credit. Still there is a mystery about 60,000*l.* a-year going down the river; and certainly if any agent could be proved to be feeding on the "squatters" returns the shareholders should weed them out. These men on the stream are men of genius, and useful men, and are doing nothing wrong in catching the tin; but they should be at or near the mine, retaining the tin for the company. To speak plainly, it is my belief the tin at the mines is not properly handled if so much goes down the stream. In my day I have had the dressing of nearly every sort of ore, and long ago I discovered that tin is a ticklish thing to deal with; but these are points that I call every agent's attention to, and ask them to point out what is to be done to catch this loss of tin to the mine proprietors? I might even say waste of tin, seeing that parties tell me the seaboard is worth 1*l.* per ton; but they do not tell us what portion is gone to sea, or if Nature requires it there to tin the fish; if so, it would not be wise to war with Nature's laws.

Still, there is a question that forcibly arises, and one somewhat mysterious, on this very point. It is said that 6*lbs.* of tin per ton will pay at the mine for raising, stamping, and returning, and leave a profit to the proprietors—in fact, I know of mines doing it. This being so, I set down 6*lbs.* of tin to be worth 6*s.*, out of which dues and every expense has to be paid for raising, stamping, washing, and purifying, and the sea beach, if worth 1*l.* per ton, should have 30*lbs.* of tin to the ton. Then, why work tin mines only worth 6*s.* per ton? This may be a puzzle to every book-taught professor, but it is one which many a practical man may unravel, and I call upon practical tin miners and dressers to do their best to do so, for it is a subject of importance. I once remember a would-be scientific man being with me and the late Mr. T. R. Avery, who was very fond of questioning all his workpeople as he met them. The would-be learned man asked him why he wasted time with such men? Mr. Avery laughing replied that it was his hobby, as he never exchanged one hundred words with one of them without being able to turn one to profitable account. I will continue this subject in a series of letters, and I hope they will be read by every tin miner, and that some of them will give open and candid replies to them, with their names attached, or I must pass them unnoticed. I have here named only the Red River, but these remarks apply to the refuse of every tin mine in the two counties, unless it is proved that the red oxide of iron has a greater tendency to carry off tin than other substances.

N. ENNOR.

UNCERTAINTY IN MINING—No. I.

Sir,—Our age is an age of unprecedented and singular activities. Celerity of movement and quickness of thought are pressed into requisition in every phase of our life. We seem impelled by irresistible influences and desires. From proverbial slowness and stolidity we have gone to the antithesis of over haste. Human impulsion is stretched to its extreme tension. Our wills are inoperative before the waves of progress and retardation which either advance us to the acme of prosperity or hurry us to the goal of adversity. Coincident with the application of steam to the purposes of locomotion and propulsion, and electricity to the communication of intelligence, our conceptions have been quickened and intensified. We now rush in where once we feared to tread. We appear parsimonious of time, but prodigal in effort. We compress into a few years the work of a long life. This tendency to supra exertion is not limited to our intellectual and political advancement, but manifests itself in our commercial and speculative pursuits, and is too often accompanied by evil results. We have softened brains, premature decay, and shortened lives. We are constantly brought into circumstances which imperil our fiscal status, and drive us to the verge of almost national bankruptcy. We have our alternating periods of unexampled prosperity and stagnation, and depressing pecuniary difficulties.

But it is remarkable that in the midst of this wonderful intellectual development and scientific research we have no truly scientific basis for mining operations, and this is the more unaccountable, seeing that science is so extensively and successfully applied to the various branches of our industry and manufacture. Science is the true coadjutor and minister of human progress; no domain of nature is exempted from its keen and eager scrutiny. The remote planet and the most familiar substances are alike subjected to analysis. With singular prevision, "She stretches forth her hand and charms the latest secret from the moon." By its aid we are gradually acquiring supremacy over the destructive elements of nature, and no department of our social life remains unaffected by its power. We have made the lightning the swift messenger of thought, and have reduced the power of steam to the docility of childhood; we have made the beam of light our portrait painter and the sun the recorder of his daily history; the pathless sea has become the familiar highway of all nations, and our commercial intercourse with diverse peoples has been accelerated and enlarged; we have enriched our pharmacopoeia by the knowledge of plants, and have transmuted dead and inert matter into living force and useful commodities, and in other manifold ways we are constantly deriving wealth and strength. Our civilisation would be incomplete and impossible without the auxiliary assistance of science. It has been well said "The thoughts of men are widening as the progress of the sun." We are witnesses to the slow evolution of great governing and regulating principles from the most apparently contradictory facts, and, doubtless, as our culture increases the correlation of all force will become more and more manifest.

But we have not sufficiently utilised our increased knowledge in Mining. It is true we have perfected our machinery, and improved our mode of dressing and preparing mining products. We have added to our facilities for sinking and hauling by a more extensive application of mechanical power, but still one without any reliable information to direct our explorations, we grope on in comparative obscurity, and, at best, resemble human truffle hunters. Our actions are more instinctive than inductive, and we are too contented with the rule and appealing empiric that "where 'tis there 'tis." We have scarcely superseded the use of the dowsing-rod. Is there a necessary connection between mining and uncertainty? We presume that some law determines the deposition of metallic minerals, that chance and caprice do not operate more powerfully in the production of lodes than in the formation of matter generally; and it is obvious that the abundance of facts, and the accumulated experience we possess, would considerably hasten our enlightenment, and decrease our ignorance, if they were systematically arranged, and prepared with the view of solving the many difficult questions which appear inseparably associated with the deposition of metallic veins. Theory and practice have too long been antagonistic to each other: we have not endeavoured to effect a combination which would materially assist us in the explanation of many obscure phenomena.

The miner looks with distrust upon the assertions of the mere theorist, and rightly so too, for in many cases those theorists have arrogated to themselves knowledge which they have never acquired, and have predicted results which have been proved to be totally at variance with well ascertained facts. Unfortunately, these would-be geologists have seriously impeded the advance of scientific mining, but the miner should not be deterred by such impediments; and he should also remember that whatever objections he raises to theorising, he is constantly compelled to exercise the same faculty as applied to the relative distances of the planets in his daily avocation to meet the difficulties which beset his pursuit; and we would remind him, also, that what is now proved to have a real existence in fact, was once

only a shrewd guess, or at least an opinion founded upon inference. Take for example "Bode's Law of Arithmetical Progression," and the doctrine of "Phylloaxis in Botany." We have verified by actual discovery the correctness of the former theory, and have learnt by the latter that leaves are not promiscuously placed upon trees, but that they are disposed in such a manner as to be in accordance with geometrical order and arithmetical exactness. In those cases the theory anticipated the fact, and to its promulgation may be attributed the discovery.

It is quite possible that in mining a similar result would follow if we would discard prejudice, and investigate the doctrine which seems so opposed to our preconceived opinions. We know full well that the mine agent has comparatively little time to devote to such investigation, and we assume that we are imputing no blame to him when we assert that in too many instances his previous education unfits him for the task, even if he were so disposed. Considering the great disadvantages under which he labours, he cannot be praised too highly for the skill and ability he exhibits. But we submit we have sufficient evidence of a rudimentary character to form a basis for induction. We know that copper and lead lodes have each their respective bearings and dip—that cross-courses cause displacements to the right or left of the true course. We know that certain rocks are congenial for the production of mineral, and that the continuity of the vein to such strata enhances the chances of productiveness. We know that in certain localities when similar indications obtain that the same lode is found productive and poor, the distance of a few fathoms apparently determining the opposite conditions. We know that a change in the constitution of granite—its decomposition—affects the value of the lode. Tin is usually associated with chloride and granite, but quite recently we have discovered it in combination with arsenical pyrites at New Great Consols. We know that copper is almost exclusively found in clay-slate, but we have a remarkable exception to this, for according to De la Beche, the rich deposit of ore at Wheal Friendship is in the carbonaceous strata. What freak of nature is it that limits the existence of tin to the counties of Devon and Cornwall? and how is it that manganese is only associated with trappean rocks and dunstone? These are only a few of the facts and questions which continually present themselves to the mind of the intelligent and thoughtful miner for solution.

It would be tedious and unnecessary to recapitulate all the indications which induce men to explore, and which guide them in the formation of opinion and the estimation of mining property, but sufficient has been adduced to show that they do not warrant us in assuming that they are a mere fortuitous concurrence of circumstances. Law is as much concerned in the production of these dissimilar effects as it is in the production of the determinate crystalline forms which enables us to classify our minerals. All the kingdoms of Nature are under the dominion of law and order. It would be unwise to suppose that the mineral deposits which exist in our midst are the result of caprice and chance. It would be equally unwise to suppose that it is impossible to form a basis for induction because we have already evidence to the contrary. The exploration of our coal fields the sinking of Artesian wells, and the predicated existence of gold are purely matters of geological induction. Very few have been the attempts to reduce the disorder and uncertainty to order and certainty.

Mr. Hopkins, in his "Magnetism and Geology," has suggested an approximative cause. Mr. W. J. Henwood in a recent work has aimed at a similar result, but the great field of unexplored facts is still open for the exercise of ingenuity, observation, and thought. Our theories are unsatisfactory, and only approach the character of incipient explorations, our ideas are still in a state of chaotic confusion. If the miners who style themselves mining engineers, and who we suppose possess the requisite information to entitle them to the appellation, were to devote their attention to the elucidation of these difficult questions, they would be employing their time and talents more usefully than in the production of reports which too often lead speculators to invest their capital in adventures which terminate in disappointment and loss, and we would indicate to Mr. Barnard, our latest and great authority on mineral deposits, that if he were to employ his thought in the same direction it would do more to avoid the impending bloodshed and ruin of London than his great discovery of silver.

H. E.

REVIEW OF MINING FOR THE YEAR 1872—No. II.

Sir,—After the fearful panic and protracted collapse of 1825-6, and up to the year 1830, mining enterprise in Cornwall was all but dormant; nay, many of the great undertakings were abandoned, and the spirit of adventure had subsided into reckless indifference, not only in respect to the present but apparently in regard to the future. It is true that at that period we had the wonderful mines of Gwennap, Camborne, St. Ives, and St. Just to inspire confidence, but it took all the wealth of the Consolidated Mines, St. Ives Consols, Levant, Great Wheal Vor, Dolcoath, Cook's Kitchen, North and South Roskear, Old Tolgus, Harmony and Montague, the Crinisses, Tresavean, Penstruthal, with others of minor note in Cornwall, together with the marvellous riches of Wheal Friendship, in Devonshire, to awaken and rekindle the latent spark of action, and thus sustain the hopes of capitalists in the future successes of mining. At this period the mining interests of Cornwall suffered severely; the Great Wheal Alfred, under the management of Messrs. Taylor was wound up—labour became scarce, workmen, as a rule, not half employed, and wages declined to the minimum point. Miners were paid only from 30*s.* to 35*s.*, and up to 40*s.*, (or say) 18*l.* to 24*l.* a-year, working 48 up to 60 hours per week, captains 4*l.* to 5*l.*, while in exceptional cases only did managers receive above 7 to 8 guineas per month, devoting their whole time and services to the use of their employers.

Two years later, 1832, the Reform Bill was passed, and the two general elections in that year infused enterprise and the spirit of adventure once more into Cornish mining, and great was the activity which prevailed for the ensuing 10 years, and up to the mania, for the construction of railways that culminated in the panic of 1847. During this period were discovered South and West Caradon, East Crofty, Botallack, Providence, Margaret, Trethellan, Treviskey, Brewer, Carn Brea, Tincroft, Seton, North Pool, East Pool, Devon Great Consols, Trelawny, Mary Ann, Par Consols, Fowey Consols, Wheal Basset, and various other successful mines, that at present are either merged into and amalgamated with the concessions of other companies, or otherwise "spun their yarns," and cease to exist as profitable adventures. At no period did mines pay so well as for the 10 years 1835 to 1845. We had then Tresavean paying 100*l.* per share two-monthly, with an occasional bonus, 32*l.* paid, (or say) 20*l.* a year for each 1*l.* sterling subscribed. East Rose, 60*l.* to 80*l.* two-monthly and others. For example, at Levant, South Caradon, North Roskear, St. Ives Consols, Fowey Consols, Devon Great Consols, Par Consols, Basset, Carn Brea, and Botallack were ten of the most brilliant prizes of the period to which we refer; and subjoined are the statistics of the properties in question up to the current date:—

	Outlay.	Dividends.
Levant	£ 400	£ 175,160
South Caradon	640	355,584
North Roskear	1,400	104,000
St. Ives Consols	7,520	446,570
Fowey Consols	19,760	205,000
Devon Great Consols	1,024	1,192,960
Par Consols	7,200	220,960
Basset	2,624	326,912
Carn Brea	15,000	277,000
Botallack	18,200	123,960
Total	£73,768	£3,428,026

The gross expenditure of capital on these ten mines amounted to 73,768*l.*, and the dividends reach the large sum of 3,428,026*l.*, being 46*l.* 10*s.* on every pound sterling invested. Par Consols and Fowey Consols have ceased to exist as mines of importance, but Levant, St. Ives Consols, and North Roskear appear likely to revive, while the other five still rank among our choicest dividend concerns, and command a market value of 400,000*l.*, being 560 per cent. on the capital embarked, in addition to dividends.

The aspect of the labour market in the Far West is widely different at the present moment from the position it assumed in the years 1830 to 1845. During this period it ranged from 35*s.* to 40*s.*, and

very rarely beyond an average of 50*s.* up to 55*s.* per month; and now, owing to emigration, and the continuous drafts of skilled miners to Australia, America, Canada, the Brazils, California, and other foreign countries, added to the success attending the development of our tin-producing districts, the demand being increased for labour in home enterprises, and the supply greatly diminished as well as deteriorated in value, while the hours of employment are fewer, and consequently the amount of work effected lessened in volume and worth to the owners of mines; the average wages at this time is not far short of 4*l.* 10*s.* per month of four weeks, of 40 to 42 hours occupation. It will, therefore, be well for the workmen to remember that capital has its claims as well as labour, while society has its claims as well. It is true that many companies are paying exceeding well, but then materials, machinery, and merchandise are 30 to 40 per cent. in advance of the prices ruling 20 years ago. Hence the proprietors of mines have to encounter extra charges on every point, and but for the greatly enhanced price of tin, and the quotations ruling for lead and blende, it is a question whether the great producing districts of Camborne, Illogan, Redruth, St. Austell, St. Agnes, Uny Lelant, and St. Just would now be so remunerative as were the mines over the period 1830 to 1835, when the average remuneration to workmen was barely one moiety of that now prevailing. The men have, however, claims on their side, as well as capitalists who work the Cornish mines, and but for the restricted hours of employment we should have more sympathy with the labourers than we have, especially regarding the high prices of provisions, and the enhanced cost of the necessities—say naught of the luxuries—of life.

Returning, however, to the year 1830, Dolcoath, Cook's Kitchen, North and South Roskear, East Crofty, Stray Park, Wheal Frances, and Camborne Vean were the only mines at work on the north side of the Carn Brea hill, with Basset on the south side, comprising the two parishes of Camborne and Illogan. Tincroft and Carn Brea, now two of the best and most profitable tin mines in Cornwall, were at that period suspended, and the workings filled with water. It is true that we had the Old Tolgus, Harmony and Montague, and Old Buller in Redruth, with the brilliant success of Tresavean and the Gwennap Mines to encourage the late Capt. Teague to re-work the former and Joseph Lyle the latter, and wonderful have been the results of their achievements. Penstruthal, too, at this period was in its zenith, having realised 80,000*l.* of copper ores in one year, but at this period neither South Frances, East, West, and North Basset were known, nor were the riches of East Crofty, East Pool, or North Pool even discovered, far less developed. The first-named gentleman had met with distinguished success at Tresavean, which at one time, as already stated, divided 600*l.* upon each 32*l.* 10*s.* share yearly—that he not only started Tincroft, but likewise Trumpet Consols, still paying 8000*l.* dividends yearly, and likewise several other important and valuable old abandoned mines until he became the most distinguished miner of the day. Capt. Lyle also started the Relistian, Duffield, and Wheal Kitty (St. Agnes), the last of which is one of our best existing tin properties, and adjoining which is the St. Agnes Consols, that bids fair to rival its rich neighbours; about the same period Lord de Dunstanville and the Messrs. Prads started the East Crofty, that declared dividends of over 98,000*l.* upon an expenditure of about 11,000*l.* The success of this property led to the re-working of East Pool, North Pool, West Tolgus, and other valuable properties.

About the year 1840 Dolcoath and Cook's Kitchen showed unmistakable signs of exhaustion of copper ores, and their executives paid little or no attention to tin as a product for future operations with chances of gains; and even the late Capt. Charles Thomas, 10 years later, spoke of tin in a qualified manner, and profits depending wholly upon the market price of that metal. In fact, the discovery of the immense deposit in Dolcoath, "so valuable in depth," was made by a pair of tributers, who drove a cross-cut at their own risks, upon an agreement to have a high tribute for six months, in case of success, as a reward for their time and enterprise. The results are manifest; they were richly and deservedly recompensed, while the adventurers have secured a property worth 285,000*l.*, and dividends of 45,645*l.* a year. We allude to this circumstance as evidencing the value set on tin ores in this at present unparalleled district so recently as 20 to 23 years ago. This property is greatly enhanced in worth; consequent on an extension of ground westward, a portion of Stray Park being added to this company's grant. Adjoining this mine is situate the New Dolcoath, comprising the western part of Stray Park, Camborne Vean, and Wheal Frances setts, and embodying a field for mining enterprise unsurpassed in the county of Cornwall. The company consists of 8000 shares of 3*l.* each, fully paid-up, and the returns are now just merging into gains, and, according to the judgment of practical authorities, these will materially and rapidly augment during the coming and succeeding years. The levels of Dolcoath are extended into this property, and for a long course of years the works can be prosecuted without the aid, and consequent outlay and expense, of pumping-power, which alone is equal to a dividend of 10 per cent. on the capital. There is not only promise in the prospective, but certain and substantial dividends near at hand, and we must again congratulate Capt. Vivian on having secured a prize in this instance, as we did last week in referring to South Conderrow and the St. Agnes Consols. It is also a point of immense value in favour of the secretary, Mr. Comyn, who so early in his career so fortunately and happily secures among his constituency a mine of such sterling promise and advancing wealth.

There are many peculiar and favourable characteristics associated with New Dolcoath. In the first place, the lodes in their upper sections were exceedingly rich in copper, as was the case with Dolcoath, Cook's Kitchen, Tincroft, and Carn Brea, all of which are now communicated with each other, and constitute the richest group of mines in the United Kingdom, commanding a market value of 825,000*l.*, and yielding for the current year no less a sum than 118,000*l.* in dividends. Returning, however, to New Dolcoath, the yield of copper ore was over 400,000*l.*, and the veins in several levels and in depth exhibit similar promise of large bodies of tin as is proved to exist in the several mines referred to. Still it is singular that, from one circumstance and another, until recently the workings have never been carried out with any degree of method, energy, or earnestness. Stamping machinery on an improved principle, cheap in first cost and comparatively inexpensive in maintenance, is being erected, and the dressing paraphernalia extended, which in the early spring will be completed. In this property there is ample scope for legitimate gains, and the public will do well to turn their early attention to the purchase of shares, selling in the aggregate for less than half a year's dividend of either of its neighbours, Dolcoath and the adjacent mine of Tincroft.

East Pool, discovered by the late Capt. Nicholas Tredinnick, about the year 1835, rose rapidly in market value from 5*l.* per 128th share up to 52*l.* (say, 67,200*l.*), with 640*l.* called up. The dividends over the 37 years amount in the aggregate to 84,400*l.*, averaging 2281*l.* annually, or 3*l.* 7*s.* 6*d.* per cent. over the period. The dividends are now 2*s.* 6*d.* quarterly, and the market price 134*l.* per 6400th share, equal to 86,400*l.*, hence the mine is selling at 27 years' purchase. This mine is high enough, one would think, to deter investors, yet the shares are rather favourites both in Cornwall and upon the London market.

Tresavean and Penstruthal about the years 1830 to 1840 were exceedingly rich for copper, the former declared in the aggregate dividends, over 450,000*l.*, or about 3200*l.* outlay—yet the works were abandoned rather than subscribe the necessary funds to lay open the workings in depth, though practical authorities assert the chances of discovering tin below the copper deposits are equal to those which existed under very similar circumstances at Dolcoath and adjacent mines which skirt the northern side of the Carn Brea Hill. To the west of this mine is the Penstruthal Consols, that formerly was most productive of copper, and though worked only to half the depth of Tresavean, became abandoned after a short and brilliant career of success. This old mine, which is comparatively unwrought excepting on one lode "from which 80,000*l.* was returned in the year," is again set to work, and promises to become a great and important property, in the first mining district of Cornwall. This mine cannot fail to make large returns of both copper and tin, while the explorations on the "one" copper lode will afford numerous rapid and economical points for cross-cutting the parallel lodes so rarely

afforded in mining enterprise, yet so valuable in respect to time and money in developing deep sections of mineralised veins, and which, in this district are ever embedded in hard channels of crystallised granite, ironstone, quartz and capels, all of which are associated with the richest and most valuable deposits of minerals found in the locality. It has ever been the opinion of practical authorities that there existed a second deposit of copper ore in depth, as it is rarely the exception to find when the chimney of the first bunch is found so near the surface—in fact, the deposit already partially exhausted was first discovered in unearthing a "fox," the ores cropping up to the sod. It is found that tin exist in several lodes, and at various points in the different veins in paying quantities. As soon as the necessary pumping and stamping machinery be erected the development must prove rapid—not by "steps," but "strides"—as in two to three years from this date the first section of 150 fms. in depth of the various lodes ought to be laid open, and the returns equal the greatest mines in Cornwall. The capital is more than ample—100,000—management sound and practical, and the local executive earnest in its endeavours to forward the workings; hence there is, in the opinion of miners, a rich harvest for those who stick to the ship while the operations are being carried out.

London, Dec. 10.

R. TREDENNICK,
Consulting Mining Engineer.

THE STANNARIES COURT.

SIR.—It would be very satisfactory to learn from the Registrar of the Stannaries Court, or from the Vice-Warden himself, what becomes of the money obtained from unfortunate shareholders in mines wound-up years ago, and upon which no claims of any kind now remain unpaid? The public have a right to know this. At the present moment shareholders in mines which were wound-up by the Stannaries seven or eight years ago are receiving letters from solicitors to the Court, threatening proceedings for the recovery of sums which were then given as bad, or as unobtainable. These legal gentlemen will not even let the dead rest.

It would be well to know also, and, perhaps, some professional reader of the Journal will answer the question—Can a merchant through the Stannaries Court sue for goods delivered more than six years ago? Or say, more than six years before he applies to the Court? If we cannot get the information required from the official, will not some Member of Parliament move the appointment of a committee to enquire into the whole machinery of the Stannaries, with a view to its abolition? Here is a vacation for an able Member—in esse or in posse.

PHILO-ARGUS.

THE STANNARIES COURT.

SIR.—I have been a heavy sufferer through the iniquitous proceedings of this irresponsible and wretched relic of a barbarous age, and I feel most grateful to "Argus" and "The Man of Kent" for drawing the attention of the public to an abuse which should no longer be tolerated. If every adventurer who has suffered would only come forward and state their wrongs, I feel confident that this miserable counterfeit of the Court of Chancery would quickly be swept away. Liberal M.P.'s have lately been talking a great deal of nonsense about this and that "Upas tree," which needs to be cut down; but here is a paltry thing, with a noble lord for its Warden, which, to my thinking, is ten times more abominable than any of the abuses which lends eloquence to post-prandial speeches. I would respectfully recommend the hon. member for Rochdale to leave "Woman Suffrage" alone for the present, as it can wait, and turn his attention to the Stannaries Court, which if he can abolish, or even reform, will, I am convinced, gain for him as great renown as fell to the share of his friend, Mr. Cobden, for his services with respect to the Corn Laws.

I do not take so gloomy a view of the independence of the Cornish members of Parliament as "The Man of Kent," though there may be one or two who lack the courage to express their detestation in common with every honest member of the Stannaries Court. Mr. Eastwick, the member for Falmouth, has already distinguished himself on missions with respect to the reputation of certain South American loans, and is in every way an independent and conscientious gentleman. No one can doubt the independence and courage of the hon. member for Liskeard, the Right-hon. E. Horsham, for was he not one of the principal founders of the "Cave?" Col. Hogg, the Chairman of the Board of Works, sits for Truro, where sits this Court; but until cause was shown I should decline to believe that this fact would influence him.

Briefly, then, we would recommend that we not only secure a motion for a parliamentary return being made of the moneys deposited with this Court, but that we endeavour to obtain a reformation, if not the extinction, of this licensed abuse. As I have said before, if everyone who has been pillaged will come forward the thing is easy. We have heard a great deal of smart things being done with several of our mines in America, and great indignation has been aroused; but at home, a day's journey from town, we have a Court, originally intended to protect the mining interest, where "windings-up" last a lifetime, costs exceed the stakes at issue, and cheques are given for 6d.

CORNBILL.

THE PROGRESSIVE MINES.

SIR.—I was somewhat interested by a letter from "Observer," in the Supplement to last week's Journal, as it touches on a subject I have considered a good deal of late—the vindication of the character of bona fide "progressive" mines, which have suffered much within the last few months from the public blindly confounding them with many worthless schemes which have been foisted upon them. I am an amateur miner myself, and am desirous of investing my surplus cash in such mines as "Observer" points out—that is, if they are as he states. It would be well for me, and others like me (who I have no doubt are very numerous), if we could be assured of the genuineness of a few concerns on the progressive list, our funds being too limited to go into the full-fledged birds, like Tincroft, Dolcoath, and others, to any great extent, and I, therefore, do hope the subject will be taken up by men more versed in the matter than myself, and that the mines mentioned by "Observer" will be more fully described by some mining authority who will, I think, fit, discountenance of them and substitute others to his mind more promising. I notice he gives New Rosewarne the pre-eminence; will he tell me the cause of the shares being so low? I hear many speak well of them, yet still the market value goes lower and lower the nearer they approach their entrance into the Dividend List. There must be some secret to this.

Taking Polrose, the mine he mentions as second to the above; it is certainly situated in a wonderfully good district, and the prospects appear to be unusually good for so young a concern; but I scarcely think he makes out a clear case for such a strong recommendation. Perhaps he has some further information behind which he will not mind making public. Again, with Rosewarne, this is the only mine he ventures to predict the probable sum required to put it on a profitable footing. Why will he not, with his apparent local knowledge, give us the advantage of his predictions with regard to the others? I trust these few remarks will lead the initiated to render further information.

Bishopgate-street, London, Dec. 12.

ENGLISH AND AMERICAN FINANCIERING.

"All honourable men."—SHAKESPEARE.

SIR.—We talk of American finance swindlers, like Jay Gould and Co., but we had better be silent and look at home. For instance, let us look at the gold and silver mine companies got up by English financiers during the past 18 months or so. If the mines were as rich in metal as they are in rascality they would indeed pay well! It is a sickening subject. The half-false statements to which "honourable men" have given the sanction of their names—the downright falsehoods put forth to gull the unwary—cannot be exceeded in Wall-street or anywhere else. The "groove" in which the system runs seems to be to get hold of a mine or a claim, to puff it off by an eloquent prospectus, to get a board well sprinkled by members of the Stock or Mining Exchange, and if "honourable men" all the better—to cause such members to recommend it to all their clients, to push it to a premium, to send a discreet manager, who understands how to cook and serve up a report, and who is to remain there for a year—to sell quietly as his grand lucious reports come in, and raise the public appetite, so that when the year is at an end and the manager returns to face "anxious enquirers," the orange shall have been well sucked, and nothing be left for the gulls but pips and peel, over which they can fight as long as they please. The sight is humbling enough for anyone who values character, and yet they are all "honourable men." Yet, say they, "We hold our original allotments—have not sold a share." No doubt, you are too wise to do that. You keep your qualification as director—say, 50 or 20 shares—and your fees will make up for all loss there; but you take good care that A, or B, or C, who has taken shares by the hundred for you, gets quiet rid of all his, amid sly chuckling from you all. Only wonder that those who do these things can show their faces among honest men; but yet they are all "honourable!" Take a few cases at random:—

Eclipse, 100,000; all gone; winding-up.
Eberhardt and Aurora, run up to 400, now 60; capital 250,000.
South Aurora, 300,000; run up to 160, now 12.
Utah, run up to 220, now 20.

Camp Floyd, run up to 180, now 40; cum multa alia.

All having been sucked by "honourable" men are now thrown to the dogs. Shame! And yet such "satisfactory meetings" are held on the return of the agent. Oh! very. Capt. Shaw returns and "explains" about Camp Floyd, and the shares dwindle away more and more, on quiet realisations consequent on ooziings out of the truth, which the wise ones had known long before. It was said that Camp Floyd was the mine of the year, would work all the year round—earth, air, and water being all in its favour. This is false, as already appears, as to the water, and worse is to come, as the shares still dwindle, and (as if to conceal the fall) are very rarely quoted—now, to attribute all to shares being forced in the market is now too old a dodge. If the things were good there would be plenty of buyers. Yet all persons concerned are "honourable" men. Oh! certainly. And I observe that Mr. Murphy has returned from America to "explain" about the Utah Company. The Lord preserve us from his explanations! Already the wind of them has reduced the shares 30 percent; the shot itself will probably send them beyond the power of analysis.

These things make one blush for one's countrymen. Such a miserable exhibition

to make to foreign nations! At least let us make no more attacks on America about the Erie Ring, &c. We cannot afford it! Let us first "purge ourselves and live cleanly," as Shakespeare says. When will John Bull cease being John Gull? 'Tis true that the correlative of knave is fool; and 'tis true that fools generally beget fools; but still, that civilisation should seem to increase each class in a double ratio compared with the times of ignorance is almost enough to make a man wish for the dark ages again. Meanwhile, I ask you to allow me space for my "lament," which is a very natural expression to proceed from—

A VICIM OF "HONOURABLE MEN."

THE BRAZILIAN MINING COMPANIES.

SIR.—The reported unexpected re-appearance of Mr. Henry Haymen on the scene after all the hard things recently said of him, both by the public and his colleagues, surprises many people.

The shareholders in the several companies will naturally look for some explanation; therefore, it may be just as well to mention two or three little matters upon which we shall require to be enlightened:—

1.—Holding the post of Chairman of so many companies for working mines in South America, why did he betake himself to the West of America without letting his colleagues know his intention of so doing?

2.—What induced him to telegraph to his colleagues that he would return in a week or ten days when he proposed going to the Far West?

3.—Having been told, and he got some of his valuable Samaritan to advise his friends on this side of it, and thus assuage the just wrath of anxious shareholders?

4.—When Chairman of the several companies, why did he, having no more power than his fellow-directors, rule the entire management of the concerns?

5.—His intention with respect to the Eclipse calls? His sickness must not, of course, be questioned; but does it not strike one as extraordinary that, after such a long and unexpected absence, he did not inform his colleagues by telegram from the port of embarkation that he should really come home this time? Had he done so, would they not have postponed the meetings of the Don Pedro, Anglo-Brazilian, and Anglo-Argentine Companies until his arrival, in order that he might be present to afford explanations, and make an effort to retain his position on the boards, a position which he can now never hope to re-occupy?

Dec. 10.

A WRATHFUL SHAREHOLDER IN ALL THE BRAZILIAN MINES.

THE UTAH MINE, AND ITS MANAGEMENT.

SIR.—You have kindly allowed me from time to time to make remarks in your valuable Journal respecting the Utah Mines. Professor Clayton's report is now before me, and by it I am glad to find that the remarks I made in the Journal at the time were, in fact, what has struck the Professor. Not to take up your valuable space too much, I would refer my fellow-shareholders to pages 5 and 6 of the Professor's report, in which he states, closing this part of it, "Buying ores from the adjoining property, of the same general type as that found in your own ground, is a little like carrying coals to Newcastle, to say the least of it." My remark at the time was that I could not understand "Why Mr. Murphy was purchasing carbonate ores when, by his own account, he had plenty of them in our own mine." But I must confess that what did wonderfully surprise me was that with such an able man as Mr. Batters on the board, such humbug should have been allowed for a moment. I am not a scientific miner, but I hope I have some little common sense, and therefore I prefer drawing the attention of my fellow-shareholders to what, to say the least, appears strange to me (as also to Professor Clayton) than entering into an argument with Mr. Murphy at the meeting, with the hope that some more able shareholder than myself will solve the mystery of this extraordinary proceeding.

I would also draw the attention of my fellow-shareholders to page 7 of Professor Clayton's report, especially where he states, "I am inclined to favour the plan of dressing the ores and selling them at Sandy Station;" also to page 8 in his report, in which he states, "It will be well to prove the value of the ore by sending a sample to the deep," and also to a paragraph of what we most need. Now I am under the impression that a good Welsh lead mining captain would suit our purpose infinitely better than the scientific Mr. Murphy, who costs us 30000 a year, and whose management, in the words of the Professor, page 6, is "essentially a failure." In Mr. Murphy's own report, of Jan. 19, 1872, it is quite delightful to see how anxious he is, for the good of the Utah shareholders, to dismiss any worthy brother in the craft in mining who possibly might have been able to give him a hint or two that his management would be more satisfactory to himself than profitable to a mine which he would drink 16 glasses of grog in an afternoon. I let him in your next, as I believe that many good mines have been rescued from failure by reviewing the management of them in the Mining Journal.

London, Dec. 11.

A UTAH SHAREHOLDER.

THE PROGRESSING MINES OF CORNWALL.

SIR.—On looking through my letter in the Supplement to last week's Journal I observe I inadvertently described Polrose as being "west" of Great Work and "east" of Polladras. I should have said east of Great Work and west of Polladras. I also find that the North Rosewarne shares are about 4/10s., instead of 2/10s., the difference having been caused by an improvement, which promises to open out something very good. On the other hand, New Rosewarne shares are receding, and will offer a better opportunity than ever to investors, who are now able to go into it very cheaply.

DOCKNEY.

A DRINKING WAGER, BY MINE AGENTS.

SIR.—Forty-five years ago mine agents and clerks were not soystemous from the alcoholic stimulants as they have been since Mr. Teare and other temperance advocates came into this country, about the year 1837; nor, consequently, are the expenses at the account-houses so great as they were before that period. I knew a mine clerk who would drink 16 glasses of grog in an afternoon. He continued his drinking habit till the end of life. When he found himself near the verge of the grave he consulted a medical gentleman, who told him that if he did not give up the habit he must die. In reply, the clerk said, "If I give it up I shall die, so I may as well drink!" And so he did, and soon died. He was one of four persons (two clerks and two agents) who made a wager, the clerks against the agents, as to which of the couples could drink the most wine, who gave up first to pay all the expenses. In execution of the agreement they repaired to the inn at Comford, in Devonshire, where the wine was brought in. The clerks were to drink 16 glasses. Two of the four selected sherry and the other two port wine. After drinking the contents of nearly two dozen bottles of wine the two agents (Capt. Rd. 8 and Capt. Rd. H.) gave up, being fairly beaten. They had to be placed, like dead pigs, on straw in the bottom of a cart, and so removed to their dwelling-houses. The two clerks, Mr. John P. and Capt. Henry T., were able to walk home, the former helping the latter. Mr. P. still survives to narrate the circumstances of this foolish bet. I am much pleased to say that drunken agents and clerks are not common now; I rarely see one. I knew all the above-named individuals.

Truro, Dec. 6.

SILVER MINING IN ENGLAND, AND THE QUEEN, KING, AND VIRTUOUS LADY MINES.

SIR.—Yes, alas! it is too true! these three mines are being wound-up, caused by the failure of the silver question; but why such intense bitterness against me from your numerous correspondents? Permit me to ask them two simple questions—1st. When would the next dividend of the two famous tin mines, Dolcoath and Tincroft, be paid if their stamps were, by some unforeseen accident, rendered useless, or the mines drowned, with no capital to repair the disasters?—2d. How many copies, Mr. Editor, of the very important and valuable Mining Journal would appear before the public next Saturday if on Friday evening you had to go to press without any type? Such in the past has been the position of the amalgamation process, and I can declare most emphatically that it has never yet been fairly tried. I still maintain that at the Virtuous Lady there are millions of ounces of silver, as some of the lodes are 50 ft. wide, and will average 8 oz. of silver per ton, 3 dwts. of gold, and 1 per cent. of copper. The world pronounces this valueless, but I say that it is wealth unbounded, and the day will yet come when one and all will be of the same opinion, and feel astonished that their thoughts could ever have been so blinded. Some 15 months since 12000 worth of silver was returned from the mine, the get of a few weeks working, but the lode was bunched. Had the mine returned 50,000, instead of 10000, I should have been a clever, shrewd, intelligent, honest fellow; as it is, I am designated as a rogue and a fool, and am told that I deserve to die in a ditch. A hard fate, certainly; but, even in that sad predicament, it is more than likely that my thoughts would dwell upon the imbecility of mining men grasping at the shadow for the substance in zealously guarding and watching over mineralised matters that contain 20 lbs. of tin, value 15s., ignoring at the same time 2000 lbs. of silver, value 2s., which can be returned with far greater profit and much less trouble. At the Virtuous Lady nothing has ever been done to extract the silver; the same may be said of the King; but at the Queen, independent of silver sold to the smelters, realising 5000 per ton, 2000 ozs. were returned from the model amalgamation works, that executed the feat of treating the enormous quantity of 1/2 ton every 24 hours of waste rubbish stuff.

The working of the rich silver lode was suddenly stopped, as I know to my sorrow, by the accident at the Prince of Wales Mine, which was the commencement of all our troubles, and ended in wrecking the three mines, and causing my ruin, even to the selling of the very bed under me. The rich silver would have covered a multitude of sins and mishaps in the erection of the machinery. Well may it be said that time is money. Had the mill been ready to run only one month earlier, even with the silver lode under water, the mine would have recovered itself by returns of silver from the burrows at surface, and all would have ended well; 10,000, and more did I lose by the failure of the Queen Mine, to be replaced only by 10,000 curses from the shareholders, whose sufferings have not been one-hundredth part so acute as my own. This confession will, no doubt, be a great relief to those who have lost a little money, and who throw the entire blame upon me. But, although ready to admit that my will has been a great legion, I can say, with a clear conscience, that the real honest, profitable success of the mines, and the interests of the shareholders, were the objects of my heart. I knew then, as well as now, that nothing but the undisputed and generally acknowledged success of the silver question could, or ever can, do me any permanent good, and to win such has been my aim at the Tamar Works the past few months. Aided by others, the works have been got into operation, and although only on a small scale as yet, it will afford us pleasure to show to any lovers of science that we are not only extracting silver but other metals from rubbish heaps. However, this is not my present subject, but the saving of the Queen Mine for all shareholders in the three different concerns. I can have the property for 12000, and purpose to form a company (cost-book) of 4000 shares, limited to 12 per share, or 40000. To say nothing of time, the machinery could not be erected, as it now stands, under 30000; we shall thus have 18000, after paying for the property; and, with 5000 further outlay, in one month I feel convinced that the mine will pay good profits. My calculations are based upon first working the silver burrows. We have an engine, 12 stamps, four calcining ovens, six revolving barrels, buddies, &c., and I can see no reason why 50 ozs. of silver should not be returned per ton, day by day, by actual work. I still maintain that the stamps will treat from 12 to 16 tons per day. If properly worked—7 oz. stamp gives for 12 tons 54 oz. of silver, and why cannot at least 50 oz. be returned per day? When I inform my readers that the stamps never run but a few days, and the barrels but a few hours, they will be able to form some idea as to the reason for the non-extraction of the silver. My next object would be to get at the rich silver lode; and, lastly, to work the copper and tin lodes, which average 25 per cent. arsenic, 1 1/2 per cent. copper, 9 ozs. silver, and 20 lbs. of tin. All of these valueless can be treated upon the mine, or the Tamar Metal Extraction

Company will be only too happy to give a fair price for the whole of the lodes as they are broken away and stamped.

I do implore those who have hitherto had confidence in me, for their own sakes, to take up the shares; it is the only return I can make. No penny premium will be charged, and I shall have no interest in the mine, having no means whatsoever to purchase any. My sole object is to make the property a success, benefit the shareholders, and win back my good name, by proving to the world that what I have said can in reality be done. 10s. per share will be paid at once, and the remaining 10s. on Feb. 1, 1873, but intending subscribers need only write the number of shares they propose to take, when arrangements will be made for the opening of a banking account, and the printing of application forms for shares. All deposits to be sent direct to the bankers. Shareholders in the King, Queen, and Virtuous Lady Mines will have the preference in the allotment of shares. It is my intention to reside near the mine, and no effort shall be spared to make the Queen yet a great success on the part of—

Tamar Metal Extraction Works, near Tavistock, Dec. 8.

THOS. J. BARNARD.

NEW GREAT CONSOLS.

SIR.—With reference to the letter of Mr. Symons, which appeared in the Journal of Saturday last, relative to this mine, in which he states that the cultivation of about 100 acres of the adjoining land is destroyed by the arsenical vapour arising from the calcining of the tin ore, it is interesting to know how this vapour affects the health of the population in the neighbourhood, and whether, from the great quantity of arsenic produced at this mine, the vapour is more prejudicial to the health of the workpeople than that at other tin and copper mines.

Dec. 12.

ENQUIRER.

NEW HINGSTON MINING COMPANY.

SIR.—A meeting of the New Hingston Company is called for Tuesday next, and the business proposed is to increase the capital by 30000, raised in debenture bonds. At the last meeting, in July, we were told that a balance of 22000 remained, which was sufficient for the development of the mine, and that at the next meeting a dividend would probably be declared. Instead of this, and without any intermediate notice to the shareholders, we are now called together, not to receive a dividend, but to increase the capital by one quarter the whole original amount. It is these things that shake the confidence of those who are disposed to invest in mines. Can any satisfactory explanation be given of such strange discrepancy between expectations and results?

A SUBSCRIBER.

THE WHITEHAVEN IRON MINES.

SIR.—The readers of your widely-spread and valuable Journal, and also Mr. Symons, are thinking I have no answer to his last letter. To remove such thoughts, you will kindly allow me to say my answer was forwarded a week ago. My friends are daily asking why I do not answer. * * * I have always considered there were two sides to all things, and that we, as Englishmen, had a perfect right to give our opinions, and particularly so through your valuable Journal. I have worked in mines 15 years, been agent of mines nearly 20 years, have surveyed scores of mines in Cornwall, Devon, Somersetshire, Lancashire, Cumberland, and Wales, and I now ask of any person for whom I have reported, "where is the mine that has turned out different from my opinion?" I have also been intimately acquainted with iron for seven years.

Altarnun, Launceston, Dec. 12.

J. HODGE.

[We have received two letters from Capt. J. Hodge, but the correspondence has become too personal, and matters of a purely private nature have been introduced, so that we have been compelled to decline its continuance.]

BELLAVISTA SILVER MINING COMPANY, PERU.

SIR.—The shareholders in this undertaking have reason to complain that so much valuable time is consumed before its works are brought into active operation. The agreement to purchase is dated two years ago, and the report in the Journal of Sept. 7 is the only one yet furnished, although the manager reached the mine about twelve months since. In this report we are told that the Candalaria Mine had been a prey to the public for years, and much silver ore carried away, and that the buildings had suffered dilapidation. There was no reference to this in the prospectus, and the lessor, or someone, ought to be made responsible. With the prospectus there was a statement that the Transito Mine alone was at that time worth 4 tons of copper ore per fm., with 1075 ozs. of silver per ton, or upwards of 10000 per fathom. Surely this is worth vigorous development, and it would be satisfactory to the shareholders to be informed that a good pile of this valuable deposit had been brought to the surface ready for treatment. I have no doubt in the success of the undertaking, and wish to make allowance for delays in a country like Peru; but I no longer wish to sign myself—

EXPECTANS.

[For remainder of Original Correspondence see to-day's Journal.]

MINING IN UTAH—LETTER FROM CAMP FLOYD.

Leicester, Nov. 20.—Here we are still as lively as ever in our busy little camp, notwithstanding the stern fact that winter has arrived, or perhaps I might better say that winter has arrived. The miners are hard at work developing their different claims for the market next season, and they hope to continue work during the entire winter, with only an occasional interruption of a few days. This is one very decided advantage which Camp Floyd possesses over some other districts in being able to be worked during the entire year, an advantage which cannot fail to be appreciated by capitalists.

General Improvements.—Several companies which were incorporated this past season, including the Camp Floyd Silver Mining Company, are busily engaged with the forces of men upon their respective properties, and are developing their claims with profitable results. The quartz mill is actively employed pounding away at the ores of the Sparrow Hawk, Marian, and Last Chance Mines, belonging to the English company, and the bullion constantly shipped to England speaks for itself of the success of the enterprise. The mill has been running all the time with only two brief interruptions, one in consequence of breaking a part of the machinery, and again for want of sufficient water to run the twenty stamps; thus compelling a temporary discontinuance of ten stamps. The company, however, is responsible for the deficiency in failing to provide for the emergency by building the necessary reservoirs during the summer season, and I hope the directors will see the importance of appropriating the requisite means for this purpose at once. The cause of the deficiency was a sudden evaporation in the spring, owing to the dryness of the past season; but it is now being speedily remedied by the late fall of snow, and the continued moist weather is increasing the supply, so that the mill will shortly be enabled to resume its full capacity of 20 stamps.

This occurrence has prompted some parties to prospect for springs, and I understand that General Connor contemplates making a water ditch to the camp from a large spring lying west of Cedar Fort, a distance of about 10 miles. This will supply sufficient water for two additional mills, and for general use of the miners. This enterprise will probably be commenced immediately, and is bound to be a success, like a similar undertaking completed by him at Pioche, where the water was conducted a distance of six miles. Machinery has also been ordered by General Connor for the purpose of boring a well near the town, so next spring look out for lively times and abundance of water for all purposes.

The quartz mill in process of erection by Messrs. Baxter and Hussey, at Fairfield, eight miles from this camp, is nearly completed. It is intended to be a custom mill, and will afford the miners a ready cash market for all the ore they may have for sale.

The Mines.—In order to economise space, I append a list of mining claims which have been more or less developed during the past summer with very good results. Western segregation of the Mormon Chief, General Morrow, America, Silver Star, Comstock, General Lowe, Michigan, True Delta, Southern Cross, Missouri, Peerless, Jenny Lind, Silver Park, Savage, Elkhorne, Antelope, Sheba, Gentle Belle, American Flag, Red Eagle, and Consolidated Camp Douglas. This list named the best and good property, and has a valuable Mining Journal would appear before the public next Saturday if on Friday evening you had to go to press without any type, or the company owning it have been compelled to discontinue working, owing to a want of means; however, I am credibly informed that they intend incorporating a stock company, and will probably arrange so as to include the Antelope and Elkhorne claims, which are considered first-class. By this means enough stock will be placed on the market to fully develop all these claims into good mines, which they are sure to make.

Mines being Worked.—The mines which are being worked at present are as follows, as near as I can learn—Silver Cloud, with a shaft 100 ft. deep, cutting a vein from the bottom of the shaft, showing a vein of 12 ft. of rich milling ore, assaying from \$50 to \$2000 per ton. A tunnel has also been run 275 ft. long to cut the vein 200 ft. below the face of the shaft. There is also a large dwelling house, out buildings, smith's shop, &c., and a mill site has been located adjoining the mine, upon which is a fine spring of water. This mine is really one of the best developed in camp, and the company were recently offered \$120,000 cash for it, which they declined to accept.

South-west from this mine comes the English company's mines, Sparrow Hawk, last Chance, and Marian, on which are employed about 50 men, tunnelling, drifting, sinking shafts, inclines, &c. The Sparrow Hawk has recently struck another body of very rich ore. West of the English property is the Carrie Steele, which is actively worked by running open cuts and sinking shafts, and is yielding good quality and quantity of ore. Next to this claim comes the Stafford Mine, which has a well-defined vein of ore 4 ft. thick, of which a recent assay gives the encouraging results of \$40 for the lowest grade and \$3000 for best. A large force of men are busily engaged sinking on the lode and selecting the ore. The improvements on this mine consist of open cuts and a tunnel some 60 ft. long, the vein stripped for 100 ft., showing good milling quartz in them all. Adjoining the Stafford, on the west, is the Lone Star, a very promising prospect, as yet but partially developed, but, from present indications, must eventually become a good mine. Both these claims are owned by our jovial friend, Major J. D. Woolley, of Cheyenne, W.T., who has become largely interested during his short connection with the mines in Utah. We welcome and need all such men of capital and energy to develop the mineral wealth of this territory. North of this is the Mormon Chief, and its extension, Grecian Bend and London, which consist of 3000 linear feet along the lode, and inclines measure about 500 ft., showing a large body of milling ore. This property has already obtained such wide reputation that it is needless to say anything further about it, except that it is soon to be offered on a European market. It is owned by W. W. Lowe, of Omaha, and others.

Further up the hill we come to the Silver Circle and Wandering Boy, now being extensively worked by S. N. Pike and Co., of New York. These two claims have gained an extensive reputation, owing to the native silver found in them, and the present workings consist of drifts and shafts, and are done by contract. North-west of these claims is the famous Star of the West, owned and worked by a New York company, of which Joseph Ran is president. The mine is at present working 12 men, who are taking out a large quantity of ore of very good quality. The vein or quartz matter is 40 ft. in width, and the ore taken out thus far assays from \$25 to \$3000 to the ton. Good houses for the accommodation of the miners, and blacksmiths' shop are on the claim, consequently the company is well provided for a winter campaign. This mine is certainly very promising, and will soon pay a good dividend to the shareholders. Looking over to the south side of the town we have the Bismarck and Delaware Consolidation busily engaged in sinking down upon the rich vein by cuts, drifts, and tunnels, and turning out large bodies of good ore. We next come to the Jenny Lind, celebrated as the only cinnabar mine in Utah. There are several tons of ore on the dump, but showing only a small percentage in metal. Work will be vigorously prosecuted until something definite is found to prove whether it will pay to work it for cinnabar. I must not omit to mention the Queen of the West, which is also one of our promising mines, and which, rumour says, has been sold to a Detroit party for a good sum.

I must now conclude my rather lengthy letter by appending a list of mines, some of

which have received and others applied for United States patents. Sparrow Hawk, Marion, Last Chance, Consolidated Camp Douglas, Silver Star, Silver Circle, Consolidated, Wandering Boy, Star of the West, Silver Cloud, and Silver Cloud mine site, Red Eagle, Gentle Belle, and American Flag. OSCEOLA. Salt Lake Daily Herald, Nov. 22.

Royal School of Mines, Jermyn Street.

MINERALOGY—LECTURE II.

SILICA, OR QUARTZ AND ITS VARIETIES.

I have to bring before you to-night a substance which we may call—silica, or quartz, which term originated amongst the German miners. It occurs in crystals so marked and so distinct as to have induced the ancient observers and philosophers to give it the name crystal (from the Greek *krystallos*, ice), because they were wont from its appearance to confound it with ice, and considered it as water congealed so hard at one time as never to have been able to thaw again since. Let us now examine the figures in which this substance, when thoroughly well identifiable, is presented to us, as in this large crystal on the table. We find that quartz in its typical condition assumes a prismatic form, having six sides, or a double six-sided pyramid, the two frequently being combined, the pyramids terminating the extremities of the prism. If we require a clue to the recognition of a small fragment of this substance we have it in this, that when held in a proper position the planes of the prism will be seen to be always striated horizontally, and this character holds good when we obtain the material from the Irish mines, from South America, or from Madagascar, whence the finest crystals are obtained. In the large mass on the table, and from 1½ to 3 ft. in diameter, weighing in such a case no less than 500 lbs., and composed of nothing else than a mass of this pure material—silica, or quartz, and in the certain and definite forms of which I have spoken. It is also met with in fissure veins which traverse the granitic rocks of the Alps, Scotland, and other places. In other cases this form may be detected embedded in certain porphyries, and in working these rocks the steel tools of the workman soon find it out by the resistance offered by the numerous crystals of this substance, scattered like small teeth through the mass, and of attention to these minute embedded crystals may often lead us to be deceived as to the economy of working such rocks. Everybody acquainted with the hardness of flint which belongs to this class, and knows that it will strike fire with steel—i.e., it is harder than steel. If we attempt to cut or scratch the surface of one of these minerals with a steel tool the latter will get the worst of it, if applied in a certain way—by pressure—and way can only be made in the rock by taking advantage of its brittleness. This character of hardness will enable us to distinguish this class of minerals from a great number of others which are more or less similar in other characters. These quartz crystals are found (amongst other places) in the mines and streams of Brazil, not only whole, but in rolled masses, known as Brazilian pebbles, and are brought over to this country to be cut into lenses. On account of its hardness, its purity, and also its coolness, it is employed for making the best kinds of spectacles. If we examine carefully we shall find that we tread this same material—quartz—underfoot in the streets of London; and we owe the smoothness and comparative comfort of our pavements to the fact that we have in a certain set of rock strata a considerable quantity of quartz, cemented together by other materials, and capable of being broken into flags or slabs. Thus we have the hard variety of quartz as found in granite, brought by natural agencies into a state of sand or powder, deposited in a water, and again raised to the surface in such a form as to be easily handled by the workman. The hardness of this substance as pure quartz prevents it being used for building or ornamental purposes in the manner of the limestones of the last lecture. But in its character as sandstone it is largely applied to building purposes, and in some districts it admits of being split up sufficiently thin as to be suitable for roofing purposes, as is frequently the case in the North of England. When we come to ornamental purposes we find that it is possible to work advantageously on some of these substances, and then their great hardness renders them capable of taking a much better polish than substances which are more easily worked. Their durability, too, is a most important character, and it has enabled thousands of the most beautiful works of art of ancient times to be preserved to our own day. What can be more striking in the British Museum and other collections than those elegant works devised and carried out by the ancient sculptors, reproduced on a minute scale on these exquisite materials with a degree of perfection, both in design and execution, which cannot fail to raise to the highest point our admiration of the skill and industry of the ancients. I refer especially to the kind which are commonly called "engraved gems," the greater part of which were worked in materials of the class, and brought before you this evening. In these gems you will see sometimes in the space of the nail of the finger the most elegant figures grouped together in such a way as to display some event of ancient history, or some point of belief with regard to the ancient mythology, and although many of them have survived for two or three thousand years, yet are as clear and bright as if of yesterday. I would strongly recommend them to your notice as examples of what the highest art of the ancient workman can do on really beautiful materials. Here hardness was a matter of prime importance, and so it was in the case of the signet rings of ancient times, when kings and officials could not, or did not, write their names, and so had names engraved with certain marks for impressing of seals; and when these came to be constantly worn about the person, and to be handed down from generation to generation, hardness was a most essential quality. Sometimes this quartz is found in less distinctly crystallised masses, and is known as "common quartz." It frequently occurs in mineral veins in almost all districts, but especially in the older mining districts, where a majority of the veins are in large part filled with this substance. In the tin district of Cornwall it is also thus found associated with gold in California and Australia in one or other of its varieties. Here is a mass from Victoria, in which it is difficult to see a crystalline form; it is colourless and opaque, and scattered through it are numerous minute particles of gold, so minute indeed as almost to elude the naked eye, and which need some process of filtration to set them free. In the outer hall you will see a large mass brought from California in the early days of the race for gold mining. In veins of tin ore quartz is the predominant mineral; in others the ore will be quite visible to the eye, but the proportion varies with every foot of the vein examined. There is, again, a red brownish mineral, capable of assuming a very fine polish, which any attempt to cut with steel tools will show to possess a similar degree of hardness to common quartz. In its red, brownish, and greenish tints the name "jasper" is applied to it, and it was known in early times on account of its durability and polish. In some instances we have a mass of quartz, containing some red and hollows of very definite form; in this case some are cubical, others rhombohedral, both forms in which we know quartz does not usually crystallise—the hollows, the rhombohedron only in the case of minute crystals. This may be explained by supposing various crystals of different substances in these forms have formed on the walls of a vein, and after the rest of the vein had been filled with quartz these crystals to have been removed by natural agencies. Thus we have, as it were, a page from the history of the vein from the time of its first opening to its being filled up with these materials, changed as we now see them. Of the other numerous varieties of quartz I can only mention two or three special kinds. From Scotland we have some very notable ones, showing a beautiful bluish tint, and known as "false topaz," and also the "fairmount," from the mountain of that name. On the other hand, we have crystals showing a smoky tinge, coupled in many cases with a great amount of transparency and reflection. These are called "smoky quartz," or "topaz." Another variety has a beautiful pink tint, from the presence of a minute quantity of a certain metallic oxide, and is known as "rose quartz." Another variety exhibits a magnificent purple tint, and is called "amethyst," which term has a very fanciful derivation—Greek, *amethystos* (not to inebriate), from a belief of the ancients that a person wearing a ring of this material might indulge in deep potations without experiencing the usual consequences. In the substances known as "agate," which are so largely used in the present day for ornamental purposes, we have a mass of small, rounded, translucent crystals of transparent rock crystal, with sometimes purple and other varieties of the same substance will often be observed. It is notable that certain rock masses which have large hollows within them, of more or less regular shape, sometimes shell-shaped, sometimes globular, appear to have received solutions of various substances in water, and thus to have had deposited within their interior some of these materials, arranged on the walls of the cavity so as to have their points towards the interior, or in other cases in layers. Sometimes, as in this specimen, the hollow is entirely filled up in this manner. In the variety called "venterite," instead of the quartz being comparatively pure, it is scattered throughout it, very much in certain planes, a quantity of what we may call impurity, but which is in reality mica. These particles have a bright colour, and reflect the light strongly through the mass of the crystal, giving it to a spangled lustrous appearance, and thus produce an agreeable tint, combined with great hardness. The tint of the crystal is usually brownish, but a bluish tint is also known. We generally use substances belonging to this class are sandstones, or aggregates of small particles of quartz rock, collected as in the case of a sand bank, and cemented either by material of the same or of other kinds. When solidified they are largely used in the operations of the builder. The coarsest of these varieties is known as "plum-pudding stone," of which we have an example not far from London, in Hertfordshire, which in the neighbourhood of St. Albans may be seen used for constructing walls, &c., and for foundation stones; it is not cut with much facility, because of the hardness of the pebbles of which it is in great part made up. Coming, next, to finer varieties, we have the millstone grit, which occurs in the backbone of Northern England, and which has been used for time immemorial for building millstones. In particular districts it is extensively used for architectural purposes. A step farther, and we come to large rocks of sandstone, occurring especially in the districts where the coal measures are, and forming sometimes the greater part of the mineral matter associated with the coal. [The lecturer here referred to the sad accident which took place a time ago at the Dolcoath Tin Mine.] By a diagram he showed that these were worked in the mining operations at intervals in their course, forming a very 60 ft. of a kind of horizontal gallery, which are protected in part by "drift" of the vein, which prevented the walls of the vein from being driven in. These were usually about 3 or 4 ft. thick, and if composed of pure quartz or opal they would be quite strong enough; but if a little band of clay runs with the quartz, even if no thicker than a sheet of paper, the case is quite different, and the walls are often fatal. The miners test these portions of rock by the sound, on the principle as the testing of the wheels of railway carriages. In some of the veins in California, especially in the great Comstock vein, in Nevada, the drift is filled in great part with quartz. Although it may be worked into at first with safety, it becomes extremely dangerous when large holes are made beneath the lives of the men. In this case, therefore, the exact nature and mode of occurrence of the rock is of very great importance, not only as to convenience of working, but also as being intimately connected with the safety of human lives. "Chalcedony" was a name applied by the ancients to a mineral of this class, first mentioned near the town of Chalcedon; it was generally applied to a series of substances differing much in colour, of very fine texture, capable of being sliced and polished, and of receiving very fine engravings. The name is generally applied in the present day to a greyish or bluish variety. Another substance will probably be known to many of you under the name of "cornelian," having great translucency, and usually of a red or flesh colour; it is very largely employed. The name, however, is not a proper one, for the white variety it ought to be white chalcedony. In the mineral called "sard" (from a town in Asia Minor) many of the most beautiful works of art of ancient times were engraved, and are now preserved in many cases quite fresh. It is much valued by lapidaries at the present day on account of its fine texture, great durability, and capability of doing full justice to the best art of workmanship. Not unfrequently in these quartz-like materials we meet with substances which seem to have been deposited in successive strata or laminae, often of very distinct colours, and in the hands of a skillful lapidary these colours will be brought out in beautiful direct and opposite combinations. In one variety there is a striking contrast between black and white, or brown and white, the term "onyx" (Greek, *onyx*, the nail) is applied; and to the variety where a black and white layer is surrounded by a reddish layer at the surface, the term "sardonyx" is given. It was considered especially valuable, and advantage was frequently taken of the different coloured layers to work out a subject in the upper red layer in relief. The pale green tint of "chrysoprase" is due to the oxide of nickel. "Bloodstone," or "heliotrope," is of a dark green colour, having red spots about it from an admixture of red jasper. A number of minerals of a somewhat less degree of hardness, and containing from 4 to 7 per cent. of water in their composition, are known under the name of "opal." Everybody knows that the coloured variety is one of the most beautiful of gems, and it never occurs in a crystalline state. It is extremely interesting with regard to the origin of these quartz minerals, for we have proof of its having been deposited from solution in no very distant period, geologically speaking. "Wood opal" (from Antiqua, &c.) is applied to a beautiful mineral substance, where portions of wood have been transformed bodily into opal, and the whole of their texture beautifully preserved; many of the woods are of the palm family. I myself had the good fortune some years ago to be present at a place in Hungary when one or two large stems of trees were dug up out of a volcanic district entirely transformed into opal. The fact was very interesting for two reasons—first, because there was evidence of the substance having been formed in connection with hot springs; and, secondly, because in the same district not very far distant is the place (the only place in Europe, and almost the only place in the world) where precious opal is found. Under the name of "agate" a great number of minerals is brought together, and these have various classical names according to the way in which the different strata have been deposited. When they occur in cloud-like masses it is called "clouded agate," besides which we have "fortification agate," "breasted agate" (where the stone has been broken up and re-cemented), "rain agate," "landscape agate," &c. It was a great problem with the ancients as to how these materials were deposited in such beautiful forms, and it is scarcely a less object of wonder in the present day, now that we are provided with more efficient means of study than those of old. Sometimes we have a mass of stalactite chalcedony, and then we are forced to conclude that it was formed drop by drop, as in the case of calcareous stalactite; and no less significant is the fact that in some of the tin veins we have on one side purple crystals of amethyst, and on the other side a white deposit of this stalactite chalcedony—the one formed by definite process of crystallisation, the other differing slightly from it (probably in a jelly-like state) formed in the above manner. If we pass to regions where volcanic agencies are at work in connection with water, as in the great Geysers of Iceland, we find more of this silicious material, which is deposited from these waters in a kind of a basin round the mouth. Here is a piece of stick, which, having been left in the water, is now coated with a mass, in general character like the opal, of "silicious sinter." Similar deposits are being formed in a somewhat similar manner in the North Island, New Zealand, and from an illustration on the screen it was seen that these deposits in some places are in the form of a series of terraces, built up entirely of this silicious matter from hot water. Again, in California are boiling springs, throwing up large quantities of steam and water, and depositing silicious sinter in such quantity as to render extremely probable that in this district at least (and most likely in others) hot springs have been the principal agencies in filling up those fissures in the rocks.

THE MORMONS, AND THE SILVER MINES.

The connection between Mormonism and mining may not appear a very strong one, yet it is not unlikely that the American prejudice against Mormonism may have led to the more rapid development of the enormous mineral riches of Utah and the neighbouring States than is generally supposed. The settlement of the Mormons at Salt Lake after their expulsion from Nauvoo no doubt materially aided in opening up some sort of communication between Salt Lake and the eastern States on the one hand, and between Salt Lake and San Francisco on the other; and thus the Atlantic and the Pacific States have equally benefited by the approaching civilisation of the vast amount of territory which separates them. The journey from New York to San Francisco is seldom made for the first time with the present means of communication without the opportunity being taken to visit the city of the Mormons in Utah. It affords the traveller something to talk about for the remainder of his days, and if he use his time aright his religious feelings will certainly not be deteriorated by what he learns of the Mormon doctrines. Mr. Bonwick is one of those who has visited Salt Lake City with the object of collecting facts, and not for the purpose of inflicting pain by thoughtlessly condemning a form of religion of which he is less than half a century's growth, but having already a number of followers in various countries, the result is that he has been enabled to write a really instructive and interesting volume, "from which the leading doctrines of Mormonism can be readily learned, and which on that account alone would be worthy of careful study. As a religious system there is quite as much to admire in Mormonism as in Judaism, with which it assimilates as closely as Mahomedanism, each of the three systems mentioned having the enormous advantage over Christianity, and especially over Catholicism and Protestantism, of being more tolerant and charitable. With the exception of polygamy, which is permissible, religiously speaking, amongst the Jews, although from the convenience of conforming to the civil laws of the countries they inhabit they do not generally practice it, there is nothing at all immoral in Mormon doctrines; and, on the other hand, there are many principles inculcated in the sacred books of the Mormons which many Christian churches would do well to imitate. It is not improbable the strongest objections that could be raised against Mormon doctrines are their want of novelty, since they are all derived from such ancient sources as the writings of Zoroaster and the works of Hindoo and Chinese writers, probably much older than the Bible itself. The Mormons very truly say, and the Presbyterians that they "want a good deal of their respect for the Bible, but always keep in the bounds the heads of their denominations have set them. If one went off the track on his own account he would be an infidel directly in the eyes of his church, while his church would be repented infidel in the eyes of other churches." But we must leave the first portion of Mr. Bonwick's book as not immediately connected with the business in which the readers of the Journal are interested, and proceed at once to the silver mines. The account of the silver mines commences at the date of the Mormons taking up their position at Salt Lake. After briefly mentioning the discovery of gold in California, and the inability of the heads of the Mormon church to prevent the rush of the Mormons with the rest, Mr. Bonwick refers to the time when the auriferous eruption appeared at their very doors. The hills around their dwellings, so desolate and forbidding in winter, so bare and blinding in summer, called these children of the plains to come and take freely of their golden wealth. Yet, not content with this bounty, they displayed before the eyes of the saints veins of silver ore which, though not so easy to extract as golden nuggets, rewarded the toiler with a gracious return for labour. The geology of the western provinces is described in a very interesting language by Mr. Bonwick, by way of illustrating the subject of silver mines. The Mormons are happily situated between the mines, as well as possessing mines. Silver Nevada is west, and gold Colorado east, while golden Idaho territory is to the north of Utah, and silver Arizona territory to the south. His account of the occurrence of silver, and the mode of separating it from its ores, will be very attractive to the general reader, although not given in language which would permit of its being turned to account by practical men. He speaks well of the Stetefeldt furnace, and refers to the mining districts of the several States and territories, including reference to many properties in which readers of the *Mining Journal* are interested. He very properly avoids all reference to the commercial value of the mines, and contents himself with describing the leading geological and mineralogical features. The Humboldt ranges, and the Washoe or silver range, where the celebrated Comstock Mine was discovered, forming, as it were, the pioneer of silver mining, are in turn referred to by Mr. Bonwick; and he suggests the great advantages to be anticipated from public works undertaken to effect the drainage of the mines by great adits similar to those of the Hartz and Gwennap. Mount Davidson, the Reese River Mines, Lander Hill, Humboldt Valley, the Toiyabe Range, White Pine, Silver Star, and the Eureka district having been in turn mentioned, Mr. Bonwick continues that Utah territory is also rich in silver ores. The Wahsatch Mountains, overlooking the Mormon head-quarters, have yielded a large quantity, and so have the Oquirrhills southward of them. The twin peaks of Wahsatch are 12,000 ft. The ores of Wahsatch are galenite and antimonial galena. The ochraceous character of some gives great facilities to mining operations. There is an absence of chlorides in the Cottonwood canyon lodes. The Emma Mine has been highly productive. The metallic oxides there were got out with remarkable ease. The ore has been gashed and desulphurising agency going on there. Antimonial ochre are common on the 6000 ft. lode. A good quantity averaged 150 lbs. of silver to the ton. A representative specimen from one lode gave other mineral constituents in the proportion of—lead, 34; sulphur, 2; copper, 1; zinc, 3; iron, 3%. But a small amount of phosphates occur in the Wahsatch and Oquirrhills. In Bingham canyon, Utah, Salt Lake county, a fine lode was traced 1200 ft. long. The iron pyrites have been very troublesome. The Last Chance country is of decomposed granite with porphyry, and the lode is of argenteriferous galena, with grey and yellow carbonates containing gold in oxide of iron. An average assay is recorded of 10 per cent. of lead, yielding \$130 of silver and \$24 of gold. Much Bingham ore has been reduced to about one-third of its bulk by a rude process, and then forwarded to Omaha by rail for further reduction. About 2½ tons of rough ore make 1 ton of bullion ore, which costs about \$120, but yields a fair profit. The water and fuel question, which in all the Western States is of importance second only to that of labour, is fully referred to, and the great value of the coal discoveries lately made is prominently pointed out, and the labour question itself receives a large share of attention. Throughout the book Mr. Bonwick has been careful to keep his narrative strictly in accordance with facts; and although his object has evidently been to furnish amusement to general readers, he has succeeded in bringing together a vast amount of information of great utility. He gives abundant proof that he has lost no opportunity of making careful observations, and that he has taken the utmost care to make his record of them thoroughly impartial; his book is in every way worthy of commendation.

"The Mormons and the Silver Mines." By JAMES BONWICK, F.R.G.S. London: Hodder and Stoughton, Paternoster-row.

RICH DISCOVERY.—A despatch dated Eureka, Nov. 11, states as follows:—The old Look Out ground, owned by the Eureka Consolidated, which has been worked four months by the Richmond Consolidated, without the know-

ledge of the former, was opened to-day by an order from the District Court, and shows the largest and richest body of ore ever opened on Ruby Hill. Great excitement prevails here among mining men.—*Mining and Scientific Press* (San Francisco, Nov. 16).

Meetings of Public Companies.

TUOLUMNE GOLD MINING COMPANY.

An extraordinary general meeting of shareholders was held, on Monday, for the purpose of receiving reports from Mr. Hawes and Prof. Janin, and to consider the present position of the company, and to take such steps, and to adopt such measures as shall seem most conducive to the interests of the shareholders.

Capt. CARLTON SIMMONS in the chair.

Mr. E. W. LAYTON (the secretary) read the notice convening the meeting.

The CHAIRMAN said the shareholders would gather from the notice just read that the object of the present meeting was for the purpose of consulting as to the best means to be adopted to ensure the success of the company. The shareholders had been called together at the earliest possible moment after the arrival of Mr. Hawes from the United States and the receipt of Mr. Janin's report. Like all foreign mines, the directors had not the advantage of inspecting it for themselves, and, therefore, were obliged to depend upon others. Shareholders were aware that Mr. Hawes had inspected the property on behalf of the company, and as that gentleman was now present to give an account of his stewardship, he (the Chairman) had very little to say; it would be recollected, also, that the special committee appointed some time since recommended the desirability of raising additional capital. About 5000*l.* was agreed to be raised upon debentures, which Mr. Hawes was strongly of opinion would be quite sufficient to give the mine a fair trial; but it was not until each subscriber for the debentures had given his consent that Mr. Hawes was commissioned to visit the mine, with the view of placing it—as Mr. Hawes said he would—in a satisfactory position. The directors had done the best in their power to promote the interests of the shareholders and to husband the resources placed at their disposal. The report of Mr. Janin was cautious, clear, concise, and exhaustive, but plainly stated that a further expenditure of capital was necessary.

The SECRETARY read the report of Mr. Louis Janin, jun., which, after detailing the position and prospects of the property, concluded as follows:—

After due deliberation upon all the facts presented, the result of my investigation is to recommend you to continue work in depth and laterally, and to assure you of a very rich and valuable prospect, a finding of ore, and, that, too, at no very great depth. But the work to be done must be carried out thoroughly, with an adequate supply of money and enough in excess to provide against contingencies. The following are some of my reasons for thus recommending you to develop your mine:—

- 1.—The district in which your mine is situated is of excellent character. There are many ore-bearing veins in the neighbourhood, and some have been successfully opened to a much greater depth than the Grizzly has reached.
- 2.—The appearance of permanency in the lode itself and the small slight indications that warrant a belief in the future.
- 3.—The fact that quartz veins usually contain segregated chimneys or ore bodies, and that in a great many instances new bodies occur in depth after the upper bodies have been exhausted. The same may be reasonably expected of your mine.
- 4.—The fact that, with hoisting works already erected, accommodation for workmen, mill to test and to work ore, should any be found, you have every advantage to prospect your mine cheaply and thoroughly.
- 5.—Finally, there are no facts apparent to warrant an opinion that ore will not be found.

Mr. HAWES said.—At the request of my co-directors and a committee of the shareholders, I left England on or about July 23 last, for the company's property in California, fully expecting that with the funds placed at my disposal, and from the favourable reports I had received from the mine, that I should be able to place your mine in a self-supporting, if not in a dividend-paying, condition, a few weeks after my arrival at the works, so that when a rich shoot was struck we should have no leeway to fetch up; but I am sorry to say my journey has resulted in very little immediate benefit to the company, owing to the action of the board. Doubtless, your directors did what they thought the best for the good of the company, but it rests with this meeting to judge between us; at the same time, I must certainly say the non-arrival of my reports placed them in a very unenviable position, but the telegraph would have set matters right if it had been thought of. I arrived at Sonora, after a good run of about eighteen days, and found my agent on his way to San Francisco; but, as I had instructions from the board to obtain a report from a well-known engineer, I went to the city, and consulted my friends as to who would be the best man, and, finding the younger Janin just then to be under a cloud and fully engaged for some weeks to come, I took the earliest opportunity of securing the services of Louis Janin, the successful manager of the Gould and Curry Mine. He is not only a Professor and Graduate of Freiberg, but a practical miner and worker of ores. The great success of the Gould and Curry property he has been connected with is sufficient guarantee, and for the paltry sum of \$200 he agreed to give you an exhaustive report of your mine and assays of the ores. I did not, and would not, give him any particulars, but asked his unbiased opinion of the future prospects of the mine, not to be given me, but sent direct to the secretary in London; and I must ask you, gentlemen, to immediately give the board authority to remit by telegram this amount to Mr. Janin. You are using his report, and it would be just in the circumstances if he were not immediately paid besides which I am personally liable. I immediately sent to the mine to prepare for inspection, and followed myself a few days after, and then made up the accounts to the end of June, and, with full reports of the condition of the property and my opinion upon it, sent them to the secretary. These accounts and reports, I am sorry to say, did not reach him—hence all this confusion and annoyance. The property had been kept in good condition and working order, and an immense amount of work done in the upper levels; but, unfortunately, the ore turned out of very poor quality—nevertheless the whole of it showed gold, but not in paying quantities. I, therefore, decided to wait for Mr. Janin's inspection, and especially as the sulphur level had caved in to an enormous extent, through defective stulls or the action of water. This level is the one in which Mr. Hart worked, and looks exceedingly promising; but to take the works up now would cost a very large sum. Mr. Janin arrived at Milton the latter part of September, and I took him to the mine. He spent three days upon the property and neighbourhood, and took from the mine several hundredweights of samples for assay. Those samples were taken all over the mine, but more particularly at the bottom of the shaft. The bottom drift had been lying so long with water in it that the footwall-gauge had been washed out to the extent of about 30 ft.—showing the easy working nature of the vein and its permanency. Prof. Janin's report you have, and, whether it tallies with my opinion or not, I must here state that two more upright or truthful gentlemen you cannot find in California. They are birds of passage, but have been connected with California and the surrounding mining country many years. Mr. Janin, finding I had an offer from a number of Cornishmen and others to work the mine on tribute or by lease, advised me to close with them; I, therefore, gave your lawyer instructions to draw up lease and agreement for a certain percentage of the gross proceeds, and the mine delivered free on consignment to the main, and, accordingly, we made them of \$30 per ton for all sulphur that did not go through the mill. I had also engaged a young man, named Bartram, as overlooker, to represent the company, and keep the accounts. I then agreed with a neighbour who has a large and valuable property that, if you like to work it, the payments should come out of the mine it is nearly adjoining, and would be worked with your mill—the price \$250,000. I gave Mr. Janin a draft on the company for his fee, and also one to pay off balance of mortgage for current expenses. These bills were dishonoured. Several men were getting me a large sample of sulphuret, not only for your inspection and reference here, but as a check upon those who purpose leasing the mine. I drove Mr. Janin to the railway, and went with him to San Francisco to obtain funds. This was about Sept. 10, and, owing to business matters and the very dangerous illness of my wife, I was telegraphed for, and had to leave immediately. I, therefore, sent cheques to those I had had money from, and the balance to my agent, and started for England, feeling sure that I had done the best for the company's interest; but, owing to the non-payment of the draft for 360*l.*, the arrangement has fallen through, and it now rests with you to determine the future course; but I must again ask you to send Mr. Janin's fee immediately.

Mr. WILLIAMSON wished to know why the sulphurets were not coming forward? One object the shareholders had in lending money upon debentures was to enable these sulphurets to be sent home. According to the statements made to them some 3000*l.* or 4000*l.* worth was at once obtainable—sufficient to put the company in funds.

The CHAIRMAN said that was the first question the directors asked Mr. Hawes upon his return, and Mr. Hawes would now explain the reason.

Mr. HAWES said he had been employed in getting these sulphurets, but the "cave in" reached the level that was so rich in sulphurets.

Mr. ROSS asked Mr. Hawes if after the last meeting he had any particular instructions with regard to these sulphurets?—Mr. HAWES believed he did, and sent out instructions not to work or use them.

Mr. HESLETINE said the shareholders had an idea that Mr. Hawes had been provided with sufficient money to pay a certain mortgage to send home these sulphurets.—Mr. HAWES said the mortgage had been paid off within \$3000, and the rest of the money placed in his hands had paid off the debts.

Mr. ROSS asked if Mr. Hawes's accounts were vouched?—Mr. HAWES said the accounts up to the end of June were sent home the month before he left, and the vouchers by the previous mail, which, unfortunately, had miscarried. They, however, were only duplicates, and the originals would be here in a few days.

Mr. ROSS did not think the shareholders would come to any decision without having time to consider Mr. Janin's report.

Mr. WILLIAMSON asked whether it was not possible to have the poor rock pulverised, so as to wash out the gold and send it to England?—The CHAIRMAN said there would be the expenses of management just the same as if the mine operations were carried on upon an extensive scale. This would require money, which unless the shareholders came forward could not be obtained.

Mr. HAWES said that he would be glad to have the report of Mr. Janin's report sent to each shareholder, and that they should be invited to state whether they would subscribe further capital, or whether the company should be wound-up, and the assets divided.

A SHAREHOLDER asked what Mr. Hawes estimated the property was likely to realise?—Mr. HAWES said it ought to realise \$20,000; he knew several who would like to buy it at that price.—Mr. BROWN asked if Mr. Gashwall would be likely to purchase it?

Mr. HAWES said Mr. Gashwall did at one time give much more for it, and so for a still larger sum. It was in every respect so similar to the mine of the London and California Mining Company of London, that it would be impossible to

tell one from the other, and yet for that there was paid 500,000, while the Tuolumne Company paid for theirs 20,000, in cash and shares.

The CHAIRMAN, in reply to a question, stated that there were 23000 worth of debentures issued, the holders of which would have the first charge upon the assets in the event of the company being dissolved.

Mr. Ross said if the shareholders subscribed further capital he should propose that there should be new directors and managers, so as to infuse new blood.

The CHAIRMAN said that as the object of his colleagues and himself was to ensure the success of the enterprise, they would gladly resign their seats in favour of anyone who could adopt more effectual means to secure that desirable end. They still believed they possessed a very good property, and Mr. Janin's report confirmed that opinion, although it was clear more money must be expended to place it in a profitable position. There was no doubt that if the present shareholders did not find the money some one else would, and thus reap the benefit of the expenditure already incurred.

After some further discussion it was unanimously resolved—"That a copy of Prof. Janin's report be sent to each shareholder, with a request that he would inform the secretary in writing within seven (7) days thereafter whether he was in favour of subscribing additional capital (and if so to what extent) or winding-up the company."

A vote of thanks to the Chairman terminated the proceedings.

THE SATURN SILVER MINING COMPANY OF UTAH.

A meeting of shareholders was held at the Cannon-street Hotel, on Monday. Mr. H. W. SPRATT in the chair.

The notice calling the meeting having been read by the secretary, the CHAIRMAN said he would first make a few observations with respect to the report, and then call attention to one or two practical points in connection with which the directors desired the co-operation of the shareholders. Since the death of Mr. Crawford the chairmanship of the company had been filled by the other directors in rotation. In the commencement of their report the directors called attention to the meeting held on the 21st of August, 1871, the object of which was to ask the gentlemen there present to express an opinion upon the report which had been sent by Mr. Fowler, and to decide whether this company should take the property or not. That meeting passed certain resolutions; one was to the effect that, having considered the telegraphic report, they determined to accept the property; and, acting upon that, they got the title in order, and instructed an engineer to undertake the necessary works, so that, as soon as possible, the shareholders might realise the splendid prospects held out to them. He supposed that there was no shareholder in the room more disappointed than the directors that they were not able to declare a dividend. Doubtless the attention of the shareholders was called to a controversy in the *Times* newspaper: there was a quicksilver company brought before the public, and the editor thought proper to make certain observations, in the course of which he mentioned this company and also another, and said it was evident Mr. Fowler was a person of little importance, and assumed that the directors had taken no more trouble to find out who Mr. Fowler was than if they had been engaging a junior clerk. The directors of this company thought it necessary to send a letter to the *Times*, explaining why Mr. Fowler was selected, but the editor of the *Times* thought fit not to insert the letter, but extracted a few lines from it. He could assure the meeting that Mr. Fowler was not engaged without the fullest investigation, and he held in his hand testimonials in which Mr. Fowler referred to some of the leading men of the day in his profession, and also referred to the chairman of a company to which he had acted for some years as engineer in India; and he might mention that Mr. Crawford, the late chairman of this company, also knew Mr. Fowler in India. Since Mr. Fowler arrived in England he had talked about himself in this way—"As to my private character" he said, "I refer you to Messrs. Rothschild." He (the Chairman) had not noticed that the Messrs. Rothschild repudiated Mr. Fowler, and therefore he assumed Mr. Fowler was known to them. Mr. Fowler had also stated that he was known to Messrs. Graham, Hawkshaw, Bidder, and Mr. Edwin Clarke, and some of the most eminent engineers of the day. Therefore, independently of the enquiries which the directors made, it seemed that Mr. Fowler was a man of some position. Whether Mr. Fowler was more of a civil than a mining engineer it was not for him (the Chairman) to say, after the experience the directors had had of him—which was not pleasing—what the directors had to complain of was Mr. Fowler's want of attention to his duties. On the 20th November, 1871, a meeting was again held, at which Mr. Fowler attended and fully confirmed his report, and he (the Chairman) would briefly call attention to one or two points which Mr. Fowler brought forward on the occasion. Mr. Fowler then talked about the large quantity of ore which was in sight, and which he valued at the large sum of 644,000. Several questions were put to Mr. Fowler with the view of finding out, as far as possible, whether that was an imaginary idea, or not; and those who were present would bear him out when he said that Mr. Fowler answered the questions in a straightforward way, and he (the Chairman) went away with the idea that the shareholders had embarked their money in one of the most glorious enterprises ever brought under his notice. Indeed, had he not found that the representations made were to that effect, he would not have been elected a member of the board; he was not an original member, but he joined in the belief that he was joining a really good thing, and one which would give handsome returns to the shareholders. He need hardly say that he and the other directors had been heartily disappointed. When a concern paid well, the work of the directors was a minimum; but immediately it came to pay then came the wear and tear and vexation, and he could assure the shareholders that he himself had worked hard, and had had a serious and anxious time, without a single hope of getting a penny for their services until they paid a dividend of 20 per cent, which they were not in a position to do to-day. It was not because the directors sat on one side of the table that they were to be cut off from the shareholders on the other side: they were in the same boat as the shareholders, and were generally very large holders, and in the present case the directors held one-fourth of the stock of the company; and when the time came, some time since, when money was required they looked to their own friends to help them in the moment of difficulty. He (the Chairman) would next refer to the question of the furnaces. The directors ordered them to be erected in January, but it was not until June 13 that they had the first telegram to say that the furnaces were in good working order. Now, the interval between January and June was a rather long one, and the shareholders would naturally want to know why there had been so long a delay. In the first place there was a natural delay, over which the directors had no control. Nature had put her treasures in very extraordinary places, and to be found they must be diligently sought for; but in addition to the usual difficulty the company had had to contend with the further difficulties caused by a fall of snow to the depth of 10 or 12 feet, which remained on the ground a long time. On June 13, when the telegram came announcing that the furnaces were in good working order, the directors were in high spirits, for they thought there was an end of their difficulties. The first telegrams came week by week, recording the fact that they had first run 44000 of bullion, then 50000, and so on, so the directors thought the company must be making a considerable sum of money, and Col. Stanford, one of the directors, who had had a large acquaintance with mining in that district, said that the ordinary proportion of profit would be very large, and that the directors would be able to pay a dividend. The directors were so confident that Mr. Fowler would let them know what the profit would be, and also telegraphed from time to time asking for the same information; but it was all no use, for Mr. Fowler would give no answer, but simply kept sending word "bullion sold," so much, and in fact the directors were sold at the same time. The directors pressed Mr. Fowler still more closely, and on July 21 he sent word there were 114,000 of profit, and that the directors would be able to pay a 10 per cent dividend on August 1, and he (the Chairman) was free to confess that he himself bought 10000 worth of extra shares. Going on from that time the directors found they could do no good with Mr. Fowler, who seemed to have a peculiar way of his own, and the directors found that the ore side had, at the outset, said to Mr. Fowler "We will pay you 7000, or 8000, as manager, and we forbid you to have anything to do with anything else." If the directors had said that they probably would have had a good servant in Mr. Fowler. But unfortunately not only this company's mine but also another was entrusted to Mr. Fowler's care, and the directors of this company found that their company had given a sort of quasi consent that Mr. Fowler might report occasionally upon the mines. Then Mr. Fowler somewhat lost his head, and no doubt the temptation to a man making 7000, or 8000, a year to make a further report on mines was great; at any rate, he gave this company the minimum of attention. The directors stopped this as soon as they could, but by that time the damage generally was done. Mr. Fowler seemed to have paid attention to those who paid him best, and this company and the other company to which he had alluded had very little of Mr. Fowler's time, and of course both suffered considerably.

A SHAREHOLDER: And he took his salary?

The CHAIRMAN: He made a claim. A gentleman who was over there at the time, in whom the board had confidence, consented to visit the mine at the request of the directors. On looking into this gentleman found the accounts in a dreadful state; no regular books had been kept, but the accounts had been kept on pieces of paper—in fact, the affairs of the mine were "at sixes and sevens." The directors thought—"That will not do for us; we are entrusted with certain sums of money, and we must see that they are applied to the purposes for which they were intended." The directors gave great offence to Mr. Fowler as soon as he found he could not go to the bank and draw right and left. He supposed the directors had rubbed Mr. Fowler up the wrong way; they sent word that he must obey them or resign, and Mr. Fowler sent word back he would do neither. The next day the directors dismissed him. It was an exceedingly difficult thing to manage a property thousands of miles away from London, and which it took three weeks to reach. He did agree to go himself, but at the last moment the journey fell through, as the gentleman who had agreed to accompany him was unable to go. The next point was with respect to the injudicious purchase of ore. At the Saturn Mine proper, instead of 644,000 worth of galena in sight, we had the belt of pyrites. Of course, this was a great disappointment to the board of directors. Whether Mr. Fowler was to blame he really did not know, although the directors had a certain opinion upon the matter. The change from galena to pyrites was said to be so sudden that it was possible he took a piece of ore, on the one side galena and on the other pyrites. Let them give the man the benefit of the doubt. If Mr. Fowler had known it would have been honest if he had confessed it at once; but he said, "I am going through the pyrites, and shall get to the galena shortly." The directors had to buy ore, not only for flux, but also to keep the furnaces going. If Mr. Fowler had attended to his duty the company would have been able to divide a large dividend, but the temptation to report on other mines was too great, and he left this company to the management of inferior workmen, and the working had entailed a loss. But the accounts had not yet arrived, and he could not tell the exact amount, but he would return to the subject again. In starting the affair a great blunder was made. The original capital of the com-

pany was 75,000, of which 65,000 was devoted to the purchase of the mine, and the other 10,000, to preliminary expenses and to erect furnaces. He could not say who was to blame. They were the shareholders and all read the reports and believed them. On Saturday last, although the directors could not give a proper account, they had drawn up an approximate statement, which would give the shareholders some idea of how the affairs stood. He was tempted to do so, because one shareholder thought proper to write a letter, wherein he stated that the directors had had 35,000, of working capital, and had made considerable profits, and wanted to know what had been done with the money. Therefore, he had had an approximate balance-sheet drawn up. The debtor side of the balance-sheet showed that the capital was 75,000, less 5000, for 100 unallotted shares, and 6000 for arrears on calls, so that the capital left was really 73,500, which the directors were entrusted to deal with. With respect to the calls in arrears, he questioned whether it was worth spending 1s. to try to recover them; the amounts were due from a class of persons from whom he believed nothing would be recovered, and, therefore, perhaps it was better for the shareholders to at once make up their minds to lose the money. It would also be seen that there was an item of "loan account, including bills payable, 92785, 13s. 11d." It would also be seen that the directors added the following notes of which is not yet known. It is also irrespective of the accounts from the mine, which had not yet been correctly sent in. The first part referred to two items; the first was the solicitor's charges, and the shareholders would be astonished to know that there had been a solicitor who for a year and a half had not sent in his bill. (A laugh.) However, he did not suppose it would be very heavy, and, therefore, the shareholders need not be afraid of it. The other was an amount due to the accountants for opening the books, and that also was an amount at which the shareholders need not be alarmed. On the debtor side the shareholders would find the cost of 65,000; the balance charges and commission in respect of the same 1800, 15s. 7d., making together 65,190, 15s. 7d. The preliminary expenses were 16485, 16s., and office furniture 1165, 10s. 9d. Now he came to the one item which he wanted the shareholders to look at seriously, for if they understood that they understood exactly the big question which stared them in the face. It was—"Cash remitted to manager for working mine and erecting furnaces and machinery, plant, &c., 12,500." Now, the whole of that amount was to be accounted for. That was the worst state of things—that 12,500 odd was to be accounted for. The directors knew that a certain amount of work had been done; they knew that heavy salaries had had to be paid; there were three furnaces erected; they had all the plant and machinery, and 20 acres of land by the side of the railway; there was the boarding house, the coal-house, and so on; therefore, looking at the worst, they knew that 13,175 was the outlay in America. If they looked at it in comparison with the returns which had been made, they would be able to see what the smelting works would do, surmising for a moment the question of the mine be that the outlay of 13,175 was bringing in about 18,000 a year. That he believed was a small sum compared with what would be received if the year were properly worked, because he had the data to show that they made 8000 a week net from the property a few weeks ago. In one of the weeks he found they made net 11185, in the next 81940, and the next 8880. This falling off was accounted for by the fact that the smelters liked to take the best stuff first, and then they went on to the worst stuff last. But when they had a large amount of ore they could mix it, and so obtain average returns. In the next week they had returns of 8888, then 8887, and in the next 40007. That, he thought, must be a mistake; but no, there was the sheet. In fact, there was no difficulty, if they had proper working capital, in making 5000 net per week. If that were the case, although the directors plotted that the manager had lost a year and six months time, still, if the ordinary working capital were provided, they would get a return which would pay 20 or 25 per cent upon the capital including the new capital which the shareholders would be asked to raise. The expenses of London management had been kept down as low as possible. The general expenses had been 511, 11s. 6d.; the telegrams (necessarily a heavy item), 1447, 0s. 3d.; advertising, 605, 11s. 5d.; interest, 7052, 5s. 1d.; original directors' fees (being an amount voted at the last meeting of shareholders), 1000, 0s. 0d.; present directors for year end, they had agreed not to charge anything till the year end, and therefore, no charge for the year; the salaries of the directors, 3554, 10s.; the stationary, printing, account-books, certificates, warrants, &c., 1500. That last was always a heavy item in the first year of a company, as it included the opening of the books and so on. There was for stamps on warrants to bearer 575; that, of course, the directors could not help. If they took the trouble to top up the various charges it would be seen that they amounted to 4998, and left practically only 5000, as working capital to go on and work the mines and pay heavy salaries, which was, of course, an inadequate amount. The manager at once wanted 4000 for coals—that was one item, and the shareholders must at once see that it was absurd and ridiculous in a company of this description to hope to carry on a good business with the trumpery capital of 5000, especially when they had to lay out a large sum in erecting works. He believed that the furnaces and works had cost about 10,000. There was no doubt that the profit of 8000 a week could be made continuously if they had the capital to work the property efficiently. Although the directors were very angry with Mr. Fowler for the mess he had got them into, yet they must render him this justice, that in putting up the furnaces on the line of railway he had secured a good deal of fully, because if he had not done this, the railway the company might have been ruined. But the Sanly Station, where the furnaces were erected, was an excellent place for bringing ore to, and the company would derive a good business if it had money to buy the ore. That was why the directors were about to ask the shareholders to raise extra capital. It was proposed to raise it in the form of debentures. There was no doubt that the 8000 a week could be kept up if they had the money to buy the ore. As regarded the mine itself (of which he had not yet spoken), although the directors had not yet received the report which they were to receive from some of the leading men of the day, still they had received certain private information that they had a very valuable property, but they had to go down to it. When the pyrites were passed they came to a bed of galena, and he believed they had a hanging wall and a footwall, with a good fissure vein, and no doubt eventually the company would make a good thing. But they had no money, and under those circumstances they would not touch the mine to make any considerable outlay until they had proper funds. He believed that a few thousand pounds expended on the property would give a satisfactory supply of ore; but, if they had not that, they must buy ore from different persons in the neighbourhood. The directors must be aware that the company had wanted any amount in particular. The company now owed about 10,000, which the directors had honoured from their friends, and there was, as he had said, money at once wanted for coal and other necessities. The directors proposed to take powers to borrow 25,000; but there was no intention to spend that amount. They would like to have sufficient to pay the money borrowed, and then they would be able to pay a dividend; they would also like to have sufficient to buy ore. The directors proposed to make up the accounts to Sept. 30, which would be as near as possible one year from commencement of operations. 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EAST WHEEL SETON is one of those mines which, like many of our neighbours, has long been kept down by the iron heel of misfortune, and it owes its existence to a numerous and worthy band of adventurers who have stuck to it, and, and have readily and willingly paid their calls at such successive meetings, in the hope that at last the fabled but brighter prospect were in store for them. Their patience has been sorely tried, but it appears that they are at length likely to receive some reward for the outlay which they have made. East Seton is certainly improving, and if there is any faith at all to be placed in the word of a practical and experienced agent like Capt. Pascoe, then the kindly discoveries which have recently been made out of Cartwright's shaft are sure to lead to good and profitable results. At the meeting on Monday, Mr. Thomas Pryor, the miner, said—"A great deal has been said about the stoppage of Wheel Cock, and there are some people who think that Henrietta will also stop. There has been a report spread that in case this should occur, East Seton would suffer considerably from it, and would, in fact, be drowned with water. These rumours are prejudicing me and the holders in this mine, and I should like to know your opinion as to what we have to fear, taking it for granted that those mines are discontinued. I am sorry to reply that he did not know. East Seton was in the slightest danger, the water never came out of the Wheel Seton, and some of us perhaps to North Westport before it would at all reach East Seton. He saw no ground whatever for the least fear."—*Western Daily Mercury.*

FOREIGN MINING AND METALLURGY.

At Rotterdam tin has been the subject of great variations. On the one hand, the smallness of the disposable stock has a tendency to support prices; on the other hand, the dearthness of capital and some failures which have occurred at Amsterdam will, probably, render it impossible to maintain quotations. At the same time, we must not lose sight of the consideration that 39,000 ingots of Banca will have to suffice until April, that discount has a tendency to fall, and that the deliveries of Straits tin from Singapore and Penang to London are insignificant. The last prices which have reached us from Holland are 86½ fls. for Banca and 82½ fls. for Billiton. At the close of November the available Dutch stock of Banca tin was estimated at 134,283 ingots, as compared with 95,832 ingots at the close of November, 1871. The Dutch stock of Billiton was estimated at the close of November at 19,300 ingots, as compared with 17,800 ingots at the close of November, 1871. The deliveries of Banca upon the Dutch markets for the first ten months of this year were 96,327 ingots, as compared with 183,008 ingots in the corresponding period of 1871. At Paris, Chilean copper in bars, delivered at Havre, has made 89½ per ton; ditto in bars at Paris, 89½ per ton; ditto in ingots, 94½ per ton; English tough cake, 94½ per ton; and Corocoro minerals (pure standard), 87½ per ton. At Marseilles, Toka for consumption has realised 84½ per ton. At Paris, Banca tin, delivered at Havre or Paris, has brought 156½ per ton; Straits, delivered at Havre or Paris, 146½; and English, delivered at Havre or Rouen, 150½ per ton. At Paris, French lead, delivered at Paris, has realised 22½ per ton; ditto Spanish, delivered at Havre, 22½ per ton; English, delivered at Havre, 22½ per ton; and Belgian and German, delivered at Paris, 22½ per ton. Silesian zinc, delivered at Havre, has been quoted at 24½ per ton; ditto other good marks, delivered at Havre or Paris, 24½ per ton.

The aspect of the Belgian coal trade remains the same, although there is a general impression that the close of the present year will witness a retrograde movement in the excessive prices of the day. These prices are considered to be in excess of those of other coal-producing countries in Europe, and influence in a prejudicial—not to say disastrous—manner Belgian industry generally, especially as regards the external competition which it has to sustain. In proof of this we may refer to the fact that it has been decided to put out 50 glass furnaces in Belgium; the proprietors of glassworks have already taken measures for carrying out this arrangement. There is a great volume of water in the Belgian rivers and canals, in consequence of continued rains; if these rains do not cease the results may be very serious in the industrial districts of Belgium. The Canal de Fond-Piquette Colliery Company, at Vaux-sous-Chevremont, in the Liège district, has just cut a bed of good coal, 40 inches in thickness. This discovery is, of course, of some importance. Quotations for coal have experienced scarcely any variation in Belgium. Coke is still obtained with considerable difficulty.

In France there has been very naturally a good deal of talk of late as to the remarkably continuous rains, which have led to inundations. All the water-courses are at an extraordinary height, and many works possessing hydraulic motors have been obliged to slacken operations, while others have been compelled to suspend them altogether. Fortunately, perhaps, this is usually a quiet period of the year, and comparatively little business is done, so that the check which production may be said to have experienced will exert no influence upon the market. Such industrial establishments as the inundations have not interrupted are working with a fair amount of activity to fulfil former engagements, and their proprietors do not express much uneasiness at the slight falling off which is noticed in orders. The floods have unhappily interrupted the regular delivery of coal, and the railway companies, notwithstanding all the efforts which they have put forth, have not been able to wholly make good the disorganisation which has resulted in the ordinary course of business. The Eastern of France Railway Company is said to place at the disposal of Prussian colliery proprietors all the matériel which the industrial require, but the Prussian authorities, it is affirmed, deal at pleasure—that is, arbitrarily—with the trucks which cross the frontier. There is little change to report in quotations; the few transactions concluded have been effected at former rates. Rolled coke-made iron brings 14½ to 14½ 8s. per ton, and machine ditto, 17½ 4s. per ton. As regards pig, prices are maintained, but with some tendency to weakness. At Paris the local demand for iron is feeble, but there has been a tolerably good enquiry upon provincial account. Rails continue in considerable demand. Plates, which are very scarce, bring 19½ 4s. to 20½ per ton.

Prices of coal continue well supported in France, but there can be little doubt that a fall in quotations is imminent. The sugar works will soon have completed their season; the winter is not very rigorous. Some domestic economy is dictated by the present high price of coal, and the orders reaching the various consuming districts show a check. All these circumstances taken together induce the conclusion that contracts for future deliveries will be concluded at sensibly lower rates. On the other hand, there are not wanting those who point to the insufficient supply of trucks which still prevails upon the French railways, to the frosts which may interrupt navigations, and to the insufficient amount of labour and means of extraction available in many collieries; but, notwithstanding all that can be urged to the contrary, it seems probable that the production will soon be equal to the consumption, and that, in consequence, the selling price will descend to a more normal level. The production of coal is daily increasing in France, and there seems little doubt that in a few years the extraction will be doubled. There are now 16,112 working people engaged in coal mining in the Loire basin; the extraction of coal is now carried on at 82 pits. The Syndical Chamber of French Coal Merchants has been complaining of the delays attending the execution of contracts concluded before the rate advanced in quotations. The Pontgibaud Mines Company has been paying this month the balance of the dividend for 1871-2 of 1½ 4s. per share.

There is more hesitation than ever in the Belgian iron trade. Prices are still maintained, however, tolerably well, notwithstanding the inevitable slackening in affairs at this season of the year, but, upon the whole, a fall in quotations seems probable. The aspect of affairs will, no doubt, experience a change in proportion as orders are worked off, and in proportion as ironmasters find it necessary to replenish their order-books. The present aspects of the Belgian iron markets are transition and liquidation more than anything else. What is most important is to enquire what are the chances of a revival of affairs at present prices. It is clear that these chances do not count for much. Belgian pig still maintains itself well, but it must soon feel the influence of the fall in English pig. Merchants' iron is still dealt in at 12½ 16s. per ton, but many industrialists admit that there is little hope of maintaining such a price much longer. Plates have seriously declined in price in Belgium, having fallen from 18½ to 16½ 16s. per ton. English plates have been formidably competing of late with Belgian, being delivered free at Antwerp at 16½ per ton. In rails there has been very little business done in Belgium of late; many contracts proposed have not been carried through, as producers endeavour to maintain prices firmly, while purchasers seek to obtain easier terms. As regards adjudication of rails for the Belgian State lines, nothing has been done at present; it is understood that the *cahier des charges* is being modified, in order to take due account of the complaints of industrialists. English contracts are stated to be in course of regular execution in Belgium. The Châtelet Rolling Mills Company will pay a dividend for 1871-2 on Jan. 2.

IMITATION RUSSIAN SHEET-IRON.—An improved process of manufacturing sheet-iron has been patented by Messrs. ROGERS and BURCHFIELD, of Pennsylvania, U.S.A. A good quality wrought-iron is made into sheet. A sheet of this iron is then coated, or otherwise completely covered, with particles of charcoal. Another sheet of iron is then laid upon the first sheet, and in like manner covered on its upper surface with similar particles of charcoal, and thus continuously sheet is placed upon sheet, until a pack is formed consisting of about 40 sheets. The edges are then clamped, and the pack is placed in a heating furnace. Then, around the edges of the pack wood, which has been thoroughly soaked and saturated with water, is placed. Then the mouth of the furnace is closed, and a fire is made. After the iron has been subjected to the action of the heat, smoke, and gases of the furnace, until each sheet in the pack has become red, the pack is removed from the furnace, and subjected to the action of a steam-hammer. The sheets are then repacked. The pack is again subjected to heat, and after being sufficiently heated is

removed, and again subjected to the hammering or equivalent force. This packing, heating, and hammering process is repeated four or five times, and the sheets are then finished.

EMMA SILVER MINING COMPANY.

An important document has been forwarded to the shareholders by the directors, in the shape of a long letter written by Mr. George Anderson, the Chairman, who has recently returned from the mine, describing the condition and prospects of the property; and the statement cannot but be considered highly satisfactory, since it is shown that arrangements have been made for more efficiently working and exploring the mine for getting out ore in larger quantity, and for guarding against such accidents as last year; that arrangements have been made for the regular sale of the ore, and contracts have been made for nearly 9000 tons; that their title has been vindicated and strengthened, and the litigation that so damaged the stock of the company has been gained, its continuance on appeal ended, and all other probable litigation prevented, at a price fairly compensated by the additional accommodation of a new tunnel to the mine. A railway has been commenced, which in less than a year will dispose of the canyon road difficulty, give regularity to the transport of ore, and save the mine upwards of 20,000 l. a year.

With regard to the state of the mine, Mr. Anderson reports that he found that with plenty of ore in sight the means and appliances were such that the slightest hitch or accident at once reduced their output, which could, therefore, never be kept up with any approach to steadiness; but till the course of the vein was better known it was not prudent to go to much expense in shafts, which might be in great part dead work. About 40 ft. of the lowest level had been cleared by the time of his second visit to the mine, and he got to within 30 ft. of where Mr. Brydges Williams found very rich ores. The samples he took proved to be even richer, two of them running to \$2005 and \$2532 per ton. These were small samples picked for richness, and by no means indicate the average of the vein, which was large and promising. Too much must not be made of them, but they give fair ground for the expectation that as they go lower they will find the ore of a richer grade. The real difficulties of the mine arise from its situation and climate; the proximity of the highest peak of the Wahsatch range seems to cause more snow to fall there than anywhere else, and, consequently, all outside work gets greatly interrupted by it. Under such circumstances great allowance has to be made for the management. For instance, when he left they had to get a boiler taken up the canyon for the engine.

They had to erect a new ore-house, and make a wagon-road at the Illinois Tunnel in order to make it available for output. The constant snows they have had since must have interfered sadly with this work, and may be the reason why the production has not been up to their expectations, as the same weather which prevented their building the new ore-house would drive them away from the horse-whim shaft. When the above work is done he sees nothing else to interfere with a full output, unless it be the canyon road, and in all probability by this time they have the snow frozen and a good winter road established over it. They have a long winter before them, and a bad climate, but he thinks all has been done that could be to guard against a repetition of last year's calamities. Mr. Anderson expresses regret that the shareholders have learned to depend on the weekly telegram arriving every Tuesday morning with unfailing precision, and that the slightest delay affects the price of the shares. It should be remembered that its arrival depends not only on no overwork on the ocean cable, but also on prompt transmission over 2000 miles of land wires, which are far more liable to accident; a small delay ought not to have a serious meaning at once attached to it.

Referring to sales of ore, Mr. Anderson states that at present the ore they sell goes to Chicago, St. Louis, San Francisco, and other places, at considerable cost of transport, which prevents their saving the whole of the carriage they used to incur in sending it to Liverpool. They have made contracts for 1000 tons a month for six months of the ordinary ore they have been getting since the cave, running about 70 ozs. to the ton; also for 300 tons per month for eight months of ore exceeding 100 ozs. per ton. These contracts are at fair prices according to the assay; they will greatly reduce the quantity they have to find a market for, and will help to secure the regularity of dividends. There is still no immediate prospect of realising the large sum lying on the dump in the form of second-class ore, but if smelting goes on developing as it has been lately doing he has not the least doubt that before long a good market will spring up for it, and at better prices than could at present be got out of it in any way; he believes it will gain its interest by keeping, and though it would be very convenient to have the money in hand, its lying unrealised is not a thing that ought to cause any uneasiness.

In the litigation with the Illinois Tunnel Company the Emma Company got the verdict, giving them the ore in dispute, with \$5000 damages, and making the injunction perpetual, and they bought the Tunnel, and so precluded appeal.

Messrs. Park and Stewart, the lawyers of the Emma Company, who are both lawyers of eminence (Mr. Stewart admitted the best mining lawyer in the United States), and accustomed to be paid very large fees, have on both trials sacrificed all other business, and carried both cases to a successful issue entirely without fee, and have not even charged their travelling expenses. The price to be paid for the Tunnel is that the Emma Company forego damages, and pay \$100,000 (about 18,000 l.), spread over next year in monthly instalments; he considers the arrangement a most satisfactory one. To assist in procuring better means of transport, Messrs. Park, Hussey and Anderson in their private capacity connected themselves with the Little Cottonwood and Wahsatch Railway. Mr. Anderson will have some 10 per cent. bonds of the line to place, and would give the Emma shareholders a preference. When the line is complete the saving to the Emma Company, even in their present production, will be, as stated, 20,000 l. per annum; and on the other hand, even at half present rates, the line is likely to be very profitable to its promoters also; so that, although the advantages to the mine first prompted them to go into the scheme, they do not think they have run any serious risk in doing so.

FOREIGN MINES.

CAPE COPPER MINING COMPANY.—At a meeting on Wednesday the directors declared a dividend of 25s. per share, payable on Dec. 24.

SIERRA BUTTES GOLD MINING COMPANY.—At a meeting on Dec. 5 the directors declared an interim dividend of 2s. per share, free of income tax, on Original Sierra Buttes shares, payable on Jan. 10.

FLAGSTAFF SILVER MINING COMPANY OF UTAH.—At a meeting on Wednesday the directors declared the eleventh monthly interim dividend, at the rate of 5s. per share (30 per cent. per annum), which will be paid on Dec. 23.

INDEPENDENCE GOLD QUARTZ.—A telegram from the superintendent at the mine announces that the boarding-house, provisions, wood, and magazine have been destroyed by fire; the new machinery is safe. The directors have telegraphed to the company's agent at San Francisco, desiring him to proceed at once to the mine, and report by cable as to the amount of damage done.

EMMA.—Telegram from Salt Lake City, Dec. 9: Raised 430 tons of first-class ore this week; 470 tons first-class ore at railway depot; 500 tons first-class raised ore at mine; sold 330 tons here.

SNOWDRIFT (Silver) MINING AND REDUCTION.—The third shipment of Snowdrift ore, about 9 tons of 2240 lbs., has just been assayed prior to sale at 27½ ounces 8 dwts. per ton, and the value will be about 65½ per ton.

CAPE COPPER.—The directors have received despatches per European.—New pump work had arrived at Ookiep, and was being fixed; the completion of this would interrupt work in the engine-shaft for a short time, probably about ten days.—Railway: Traffic for the fortnight ending Oct. 19, 169 tons up and 395 tons down. Bills of lading are received for 313 tons per Laura. Since last report 390 tons of regulus and 400 tons of ore, ex Tacoma and Galathea, have been sold by private contract, at 16s. 6d. per unit. The 980 tons, ex Glamfion and America, sold yesterday, by public ticket, at 16s. 7d. per unit, realising 25,000 l.

HUDSON (Gold).—S. O. Brown, Nov. 16: In the completion of the works I have practised the utmost economy, and have refrained from creating any expense that could possibly be avoided, with one exception, and that was the development of the "spur" of the mine through the Dunne shaft, but I am sure you will be more than satisfied with my course in keeping two men at work there until the 8th inst. when I tell you that the work done has disclosed a vein of very grade quartz. It is of a very fine grain, has sulphures very evenly disseminated through it, and no pieces which I have tested has failed to show free gold. Though I have not as yet had any tests made by assay, I feel sure the rock will go from 340 to 860 per ton. Old prospectors here, who are expert at "horning out," call it a 650 prospect. At present the ledge proper is about 2 ft. in width, but about 1 ft. of fine footwall "goings," which is a sort of siliceous porphyry, carrying a large proportion of oxide iron, will show some big a yield from the "horn" of the quartz. I am down about 38 ft. only, with a drift from bottom of the shaft to the north-west, or toward the mine ledge, of 15 ft.

We started taking out the water from the main shaft on the 8th inst.; so thoroughly had the adjacent country rock become saturated that we ran the tank day and night almost continually until yesterday, when the water suddenly subsided in a great measure, and we touched bottom. The vein at the bottom is 4½ ft. wide, and looks very promising. The "ribbon" quartz which occurs in the vein next to the footwall is wider at the bottom, evidently pitching to the north, and the vein generally carries a much greater proportion of sulphure than I find that some 300 ft. north from the shaft the top rock shows free gold, and from the character of the spur and the appearance of the ribbon quartz in the main shaft I think the directors may rest assured that a valuable chimney of rich ore exists to the north of the present workings, though not too remote to be advantageously worked through the present opening.

FLAGSTAFF.—Mr. N. M. Maxwell, under date Nov. 9, writes—The 85 feet level below adit has been driven east and west 150 feet each way, and winzes have been risen from each end, to communicate with adit, all in good ore, none of which we shall have any need to stop away for some time to come to supply the three furnaces. The shaft is still poor in the bottom, and presents exactly the same appearance as it did before we came upon the large run of ore ground above; there is now cut out and ready for stoping over 26,000 tons of ore, which is equal to about 12 months work at the above rate of exhaustion; this we hope to increase from time to time, so as always to keep a good reserve in case of coming upon poor places in the lode, which must occur in all metallic mines, and for which provision in the shape of reserves should always be made when the opportunity exists. The tram-road from the mine to the ore-house we shall be able to keep working continuously; we have had already two falls of snow, one 3 feet, and the other 4 feet, on the level, but, by keeping the level in good order, we have succeeded in keeping it open; should we fall in this hereafter we can use stone blocks, and send down all the ore we require to the ore house. A double wire-rope is now being used, with a substantial 9-ft. drum; it is an excellent and easily-governed arrangement, and a great improvement on the single bempen rope, which was dangerous and ineffec-

tive for the large quantity of ore the mine is now capable of producing. We can keep all the furnaces going through winter if the ore can be got over the road, and this must be done one way or another. In course of a fortnight I will send a detailed report upon the furnace, their working, fuel, &c.

BATTLE MOUNTAIN.—On Nov. 21 Capt. Richards reports:—Virginia: Daniel's winze, sinking below the 113 ft. level, is producing a little good ore, but the lode is smaller, and consequently does not produce so much ore as before. The 113 ft. level, being driven north, is producing no ore, but the ground has made a change, I think, for the better, and I am under the impression that if this level is continued north we shall in time open up some good ore ground. The 73 ft. level is very promising, producing some very fine stones of ore, which seem to be best in the bottom of the drift. We shall shortly sink on this lode to ascertain its extent. The stopes are without change, and are yielding fairly. We have raised 410 sacks during the week.

BENSBERG.—J. W. Hoffman, Nov. 30: November has been a very wet month, and we have had no less than 23 rainy days out of the 30; the earth is soaked with water, and the pumps in all the mines in our neighbourhood were never harder worked. We were chiefly occupied during the month in clearing fresh surface ground and getting carbonate from the open-cast. The number of men employed was 70 to 72, of which 18 to 20 were engaged with the new building and fixing plant. On Nov. 15, we involved 179 tons of ore to the Stolberg Company, the value of which was 12600 l.; since then we have delivered 50 tons poorer ore, of 200 l. value. Of the above, 79 tons assayed 61½ per cent., and 150 tons 30½ per cent.; 210 tons were carbonate, and 19 tons dressed ore. The carbonate was got from the bed at the west end of the open cast, where it appears as a thickness of from 2 to 7 feet, and extends further to the west beyond the open cast, there is about 12 to 15 feet of sand to remove before getting at the bed, and this will form very good work for the winter months; we have not been able to commence at it yet, as it would interrupt us in our washing and dressing, the space being occupied by our water-tanks, gutters, and washing drums, but which will be removed when our dressing machinery is ready for work. Besides the ore delivered, we got about 150 tons of stuff, which was laid aside for future manipulation.

J. W. Hoffman, Dec. 7: There is little alteration to report since last week. The weather was more favourable, and we got on a little faster. The large boiler is bricked in, and can be fired next week. In moving surface stuff we met with a small bed of carbonate, from which we got last week's production. From other parts of the open-cast we got chiefly wash ore. I do not expect more than 80 tons production this month, as we have a large quantity of surface to remove, which contains little or no ore, and lies on the top of the bed of carbonate. Week's production of ore 40 tons, average 40 per cent. assay; galena, 12½ tons, average 10 per cent. assay; none delivered; ready for delivery, 20 tons.

PESTARENA UNITED (Gold).—Thomas Roberts: Report for December: We have melted and consigned the gold obtained in the Val Topa district for the month of November, amounting to 270 ozs. 10 dwts. 17 grs. from 569 tons of ore raised.—Val Topa Mine: In Zero level we have commenced a new winze; the lode yields 6 tons per fathom, estimated at 12 dwts. of gold per ton. In the two ends driving north and south of cross-cut we have an improvement. The end driving south on this lode, in No. 1 level, yields 8 tons per fathom, at 9 dwts. of gold per ton. A new winze behind this end 5 tons, at 8 dwts. of gold per ton. The two stopes north and south of old winze each yield 10 tons per fathom, at 9 dwts. per ton. The stopes in back, north of cross-cut, yield 12 tons per fathom, at 7 dwts. per ton. The ends of intermediate cross-cut 2 tons per fathom. In the north of 4th cross-cut, on the new lode, we have a neighbouring lode of quartz and auriferous pyrites. Stopes south of 4th cross-cut, on the new lode, 12 tons per fathom, at 7 dwts. per ton. Stopes in bottom of flat lode, and stopes in back of this lode, suspended, not looking so well. Stopes in bottom, north of winze, on new lode, give 12 tons per fathom, at 8 dwts. per ton; and south 10 tons, at 9 dwts. The intermediate end, driving south under No. 2, on the great quartz lode, 12 tons, at 7 dwts. Stopes in bottom 12 tons per fathom, at 12 dwts. per ton; and on the flat lode 10 tons, at 8 dwts.—No. 3 level: Stopes in back of great quartz lode 10 tons, at 7 dwts. per ton. The end north of 1st cross-cut west, on the western part of the quartz lode, poor at present.—No. 4 level: The end south, on the quartz lode, continues to let out water freely, and the water increases as we advance. In this level we have commenced a new cross-cut east, near the entrance of the level, with a view to reach the new lode.

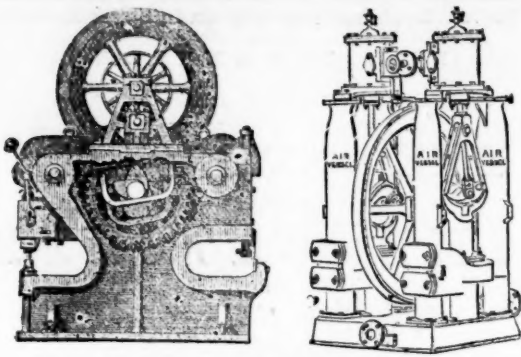
[For remainder of Foreign Mines see to-day's Journal.]

ANGLESEY, AND ITS FUTURE.—We have been hitherto dealing for the most part with the retrospect of mining in Anglesey; and although many modern samples may be cited of successful mineral operations in that ancient section of the metalliferous district of the United Kingdom, a recent discovery "illustrating certainty" was wanted to prove how eminently the island is capable of supporting its historical prestige. What the Cardiganshire silver-lead mines, referred back to as the *dimetra* of the Romans, accomplished for the civilisation of Wales proper, the copper deposits effected for Old Mona. But it is singular to remark how little Caesar, on his first raid into Britain, expected to amass the vast amount of treasure subsequently yielded by his conquest of the island. "Of one thing," wrote Cicero immediately after the disembarkation of the Roman legions, "we are already certain, that there is not a grain weight of silver on that island, nor the least prospect of plunder, but from the slaves that may be brought away. *Enim illud jam cognitum, neque argenti speculum esse ullum in illis insulis, neque ullam sperandam nisi ex mancipiis.*" However, over the spirit of the conqueror's dream, as well as that of the great historian just quoted, a change was fated to come which enhanced immeasurably the value of the accession to the rapacious people of Rome, whose way then world-wide was less distinguished for its civilising progress than for the improved development of the resources of every climate and country in which they exercised their military power. Every nation that passed beneath their yoke was, as it were, fettered to the labour of bringing from depth to surface its mineral resources. But there is no doubt, whatever hardship the ancient Britons suffered under this injurious system, that these islands have had their first elements of dominion and prosperity founded upon it. Ages are now passed away into the mists of time, but out of them come lines of light that reflect advantageously on those deposits which form the subject matter of the present article. The Mona and Parys Mines in Anglesey have long enjoyed a gnomie celebrity for "desert treasures mystic warded" which has, as the sequel of a great discovery, called to active existence those scientific operations that have made to capital such enormous returns; Mona Mine being credited with sterling profits amounting to 4,000,000 l., while Parys with a sum above working expenditure topping 3,000,000 l., while in proof of their enduring productiveness, both are still sustaining the interest of their proprietors with large dividends. In the expansive mineral zone, of which these mines form the prominent centre, is what may be termed a group of deposits called the PARYS GASES MINES. These deposits are singly and severally of an importance it would be difficult to estimate. The copper of the richest descriptions has been given the leading position; but there is an accumulative wealth attendant upon it, perhaps it would be better to say concomitant with it, which is represented by lodes of silver-lead yielding 140 ozs. of silver to the ton. Kaolinite, a rare production, and at all times commanding a high market value, number of the best quality, ochre equal as to its special quality, and, lastly, manganese of 54½ per cent. pure. So much for the intrinsic features of this property. But there must be taken into consideration a circumstance which throws them into happier relief—the highly respectable and responsible management under which Parys Gasey is fortunately placed. That executive merits every confidence, and we rejoice to see mining in Wales taking the lead, thus upon a principle of such material interest to the public. We need only mention that the energies of Mr. Henry Gibson, the London merchant, are enlisted in this cause. The zeal, experience, and integrity of this gentleman are well known and appreciated, and such auspices combined with those of his highly respectable colleagues will no doubt command ultimate success. To Anglesey in her prosperous progress we heartily say, *esto perpetua*. It would be somewhat an act of injustice not to mention, in conclusion, that the Mona and Parys Mines' service, has been the extreme danger of the mines in the process of drying it after leaving the hydraulic press. The lowness of the temperature at which guano will explode renders it a most perilous substance to expose to heat. But the difficulty adverted to has been entirely dissipated by the result of a series of experiments which has just been concluded at the Royal Arsenal, Woolwich. Mr. E. O. Brown, F.C.S., War Department chemist, has succeeded in detonating a succession of discs of gun-cotton, which were taken straight from the hydraulic press, and containing from 15 to 20 per cent. of water, without submitting them to the process of drying. The discovery was almost a matter of the metal mines, and has been a great relief to the proprietors, who had been under such circumstances; but the importance of the fact can hardly be over-estimated, for while the cotton in its damp condition is perfectly innocuous and incapable of ignition, the same cotton possesses all the explosive and other attributes of perfectly dry cotton for mining and like purposes. In the course of his experiments, Mr. Brown placed some discs of wet compressed cotton upon a slab of iron 1 in. thick without any tamping or covering. On placing the electric detonator within them and firing the mass, the plate of iron was deeply indented in the centre. A slight tapping of sand, however, placed over the discs so far increased the explosive agency that a slab of iron was shivered to fragments on detonating the cotton.

GUN-COTTON.—A discovery of some importance has recently been made in regard to the properties of compressed gun-cotton. The principal difficulty which has been encountered in its manufacture, and which has to a great extent checked the progress of its advancement as an explosive compound in drying its service, has been the extreme danger of the mines in the process of drying it after leaving the hydraulic press. The lowness of the temperature at which guano will explode renders it a most perilous substance to expose to heat. But the difficulty adverted to has been entirely dissipated by the result of a series of experiments which has just been concluded at the Royal Arsenal, Woolwich. Mr. E. O. Brown, F.C.S., War Department chemist, has succeeded in detonating a succession of discs of gun-cotton, which were taken straight from the hydraulic press, and containing from 15 to 20 per cent. of water, without submitting them to the process of drying. The discovery was almost a matter of the metal mines, and has been a great relief to the proprietors, who had been under such circumstances; but the importance of the fact can hardly be over-estimated, for while the cotton in its damp condition is perfectly innocuous and incapable of ignition, the same cotton possesses all the explosive and other attributes of perfectly dry cotton for mining and like purposes. In the course of his experiments, Mr. Brown placed some discs of wet compressed cotton upon a slab of iron 1 in. thick without any tamping or covering. On placing the electric detonator within them and firing the mass, the plate of iron was deeply indented in the centre. A slight tapping of sand, however, placed over the discs so far increased the explosive agency that a slab of iron was shivered to fragments on detonating the cotton.

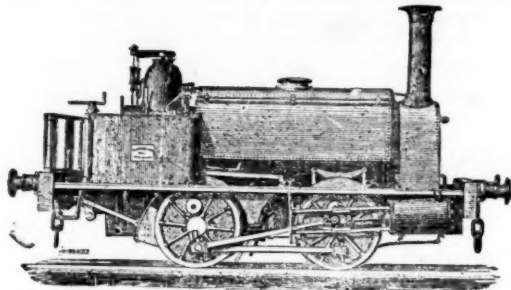
GREAT RECLAMATION SCHEME.—Most continental travellers are acquainted with that vast expanse of water in Northern Italy known as the Ferrara Marshes, covering nearly 200 square miles of what was once the most fertile land in Italy. An Anglo-Italian Company has been formed for the purpose of reclaiming these watery wastes, and plans for accomplishing the work were solicited from the most celebrated hydraulic engineers in this country and on the Continent, and the choice fell on Messrs. J. and H. Gwynne, of Hammersmith, to whom the contract for the whole of the machinery has been given. The body of water to be drawn off the land is over 2000 tons per minute, and as the consumption of fuel was a consideration of primary importance, these gentlemen have guaranteed that the maximum consumption of coal shall not exceed 1½ lb. per indicated horse-power per hour, and to deliver the whole of the machinery in 10 months. The engines will be on the compound surface condensing principle, of 1400-horse power, working centrifugal pumps, and, we believe, are the first that have been constructed for drainage purposes on this principle.

THE LATEST MINING SENSATION.—The Pacific States have shown some wonderful developments of mining industry—sap mines and paint mines being among the most curious instances in point. But a recent California journal gives an account of a still more extraordinary novelty in a honey mine. This is situated in Los Angeles county, on the eastern slope of the San Fernando ranges of mountains. In a rift which penetrates the rock to a depth of 160 feet innumerable bees have established themselves, and for years have been adding to their accumulation of honey until an enormous amount has been stored there. Certain enterprising miners have built a scaffold 125 feet high, with the intention of carrying a drift into the rock which would strike the vein of honey; but as yet all attempts to reach the coveted fruits of industry have been unsuccessful. Persons who have attempted to enter the hive by the natural opening have been driven back by the bees, who, when disturbed, in a solid column 1 foot in diameter; and some men have lost their lives in a battle with the infuriated insects. Meanwhile the bees continue to improve each shining hour, and within the last four years are estimated to have added not less than 15 feet in depth to their deposit of sweets.



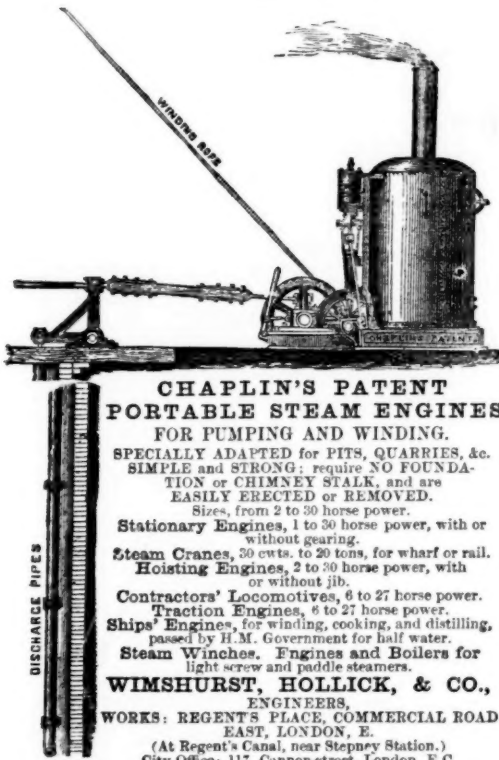
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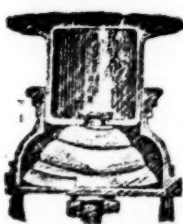
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Prize Medal—International Exhibition, 1862.

CHAPLIN'S PATENT
PORTABLE STEAM ENGINES
FOR PUMPING AND WINDING.

SPECIALLY ADAPTED FOR PITS, QUARRIES, &c.
SIMPLE AND STRONG: require NO FOUNDATION
OR CHIMNEY STALK, and are
EASILY ERECTED OR REMOVED.
Sizes, from 2 to 30 horse power.
Stationary Engines, 1 to 30 horse power, with or
without gearing.
Steam Cranes, 30 cwt. to 20 tons, for wharf or rail.
Hoisting Engines, 2 to 30 horse power, with
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Ships' Engines, for winding, cooking, and distilling,
passed by H.M. Government for half water.
Steam Winches. Engines and Boilers for
light screw and paddle steamers.
WIMSHURST, HOLLOCK, & CO.,
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CAST STEEL PISTON RODS, CRANK PINS, CON-
NECTING RODS, STRAIGHT and CRANK
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FORGINGS of EVERY DESCRIPTION.
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BLISTER STEEL, T. T. U. P. T. O. M.
SPRING STEEL, ENGINE WORKS MARKED
GERMAN STEEL, WM. GRFAVES & SON
Locomotive Engine, Railway Carriage and Wagon
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SHEAF WORKS AND SPRING WORKS, SHEFFIELD.
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Where the largest stock of steel, files, tools, &c., may be selected from.



By a special method of preparation, this leather is made solid, perfectly close in
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tial for pump buckets, and is the most durable material of which they can be made.
It may be had of all dealers in leather, and of—

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THE DAILY CHRONICLE AND NORTHERN COUNTIES ADVERTISER.
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HUNDREDS ARE NOW IN USE, AND THE DEMAND IS UNPRECEDENTED.

Some of its advantages:—
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STOURBRIDGE FIRE BRICKS AND CLAY.

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MADE BY PATENT MACHINERY.

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AN EXTENSIVE ASSORTMENT OF OVER 100 TONS ALWAYS IN STOCK.
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OVER 1000 TONS OF BARS, PLATES, SHEETS, ANGLES, HOOPS, SQUARES, ROUNDS, AND FLATS.
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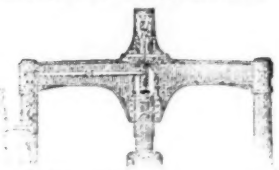
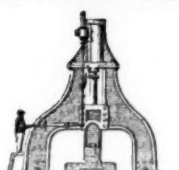
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Special
Steam Stamp.Hammer for General
Smith Work, &c.Hammer for Wheel-making,
Copper Work, &c.Hammer for General
Smith Work, &c.Hammer for Heavy
Forgings.

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20 tons, with Self-acting or Hand Motions, in either case giving a perfectly DEAD-BLOW, while the former may be worked by hand when desired.
Large Hammers, with Improved Framing, in Cast or Wrought Iron. Small Hammers working up to 500 blows per minute, in some cases being
worked by the foot of the smith, and not requiring any separate driver.

SPECIAL STEAM STAMPS, of great importance for Smith Work, Bolt-making, Punching, Bending, &c.
Hammers for Engineers, Machinists, Shipbuilders, Steel Tilters, Millwrights, Copper-smiths, Railway Carriage and Wagon Builders, Colliery Proprietors,
Ship Smiths, Bolt Makers, Cutters, File Makers, Spindle and Flyer Makers, Spade Makers, Locomotive and other Wheel Makers, &c.; also for use in Repair-
ing Smithies of Mills and Works of all kinds, for Straightening Bars, Bending Cranks, Breaking Pig-Iron, &c.

STEAM HAMMERS AND STEAM STAMPS MAY ALWAYS BE SEEN AT WORK.

PATENT STEAM EARTH-BORING MACHINES FOR MINERAL EXPLORATIONS AND WATER SUPPLY,

Capable of BORING HOLES from 6 to 36 in. diameter, and to any
depth to 2000 ft.

Price, and terms of hiring, may be obtained from the Patentees,—

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LARGE PUMPS, PUMPING ENGINES, WINDING ENGINES, &c.

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ROYAL LETTERS PATENT.

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The advantages of these furnaces are, in the first place, they effect a saving of from 25 to 50 per cent. in fuel.
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3rdly, They make from 80 to 90 per cent. less ashes than open fire-grate furnaces.
4thly, They have a purer flame, the combustion is more complete, and contains less free or unmixed air or gases.
5thly, The workmen have much less labour in working these furnaces.
6thly, They heat quicker, and are more under the control of the furnace-men.
7thly, They are not affected by the position of the wind or draughts.
8thly, The mills and workshops are cooler and more comfortable than where the open fire-grate furnaces are used.

For prices, and other information, apply to J. M. STANLEY, 27, Change-alley, Sheffield.

BURLEIGH ROCK DRILLING MACHINERY.



Specially Applicable,
TO
**SINKING,
QUARRYING,
AND
MINING PURPOSES.**
**THE BEST & ONLY
PRACTICAL DRILL.**

IT DOES NOT GET OUT OF ORDER.

PROGRESSES through Aberdeen granite at the incredible rate of 10 inches per minute.

SAVES £5 a day as compared with hand labour, independent of the enormous saving effected in the general expense, such as PUMPING, VENTILATION, INTEREST OF CAPITAL, &c., from the fact of the "put out" being increased four-fold.

DRILL POINTS.—The saving in steel alone is considerable. One drill will go through 20 feet of Aberdeen granite without sharpening.



Machine and Stand for Quarrying and Sinking.

PRIZE MEDALS:

Royal Cornwall Polytechnic Society,
August 21, 1872.

Liverpool and Manchester Agricultural Show, Sept. 12, 1872.

Middleton Agricultural Show, Sept. 18, 1872.

THOMAS BROWN,
PATENTEE AND SOLE PROPRIETOR.

Orders received and executed solely by—

CHAS. BALL & CO., SOLE AGENTS,

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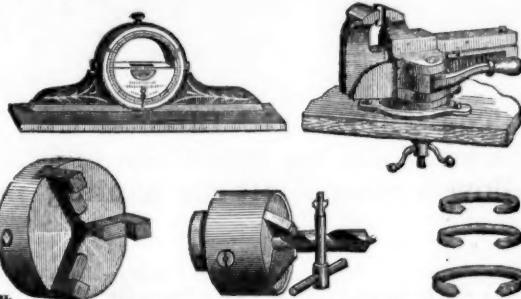
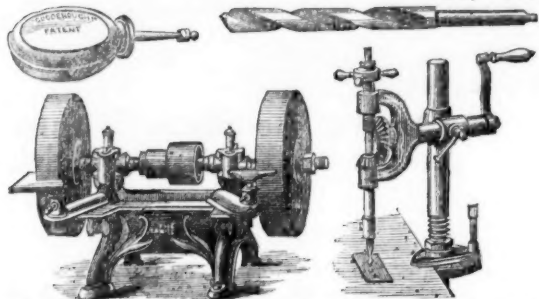
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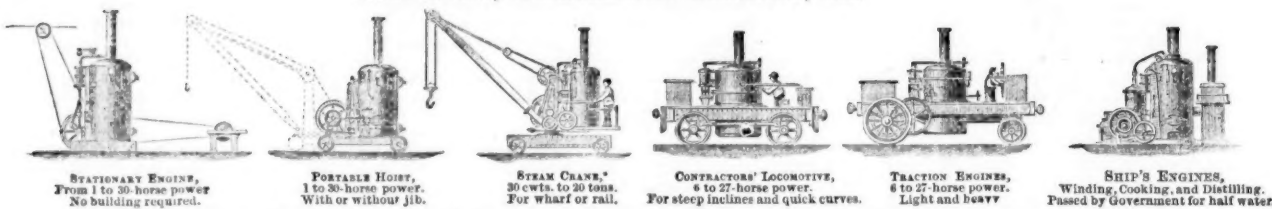
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CHAPLIN'S PATENT PORTABLE STEAM ENGINES AND BOILERS.

PRIZE MEDAL, INTERNATIONAL EXHIBITION, 1862.



STATIONARY ENGINE,
From 1 to 30-horse power.
No building required.

PORTABLE HOIST,
1 to 30-horse power.
With or without jib.

STEAM CRANE,
30 cwt. to 20 tons.
For wharf or rail.

CONTRACTORS' LOCOMOTIVE,
6 to 27-horse power.
For steep inclines and quick curves.

TRACTION ENGINES,
6 to 27-horse power.
Light and heavy.

SHIP'S ENGINES,
Winding, Cooking, and Distilling.
Passed by Government for half water.

* These engines were selected by H.M. Commissioners to receive and send away the heavy machinery in the International Exhibition. From the STRENGTH, SIMPLICITY, and COMPACTNESS of these ENGINES they are extensively USED for GENERAL PURPOSES, and also in situations where STEAM-ENGINES OF THE ORDINARY CONSTRUCTION CANNOT BE APPLIED.

ALEXANDER CHAPLIN AND CO.,

PATENTEES AND SOLE MANUFACTURERS,

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ENGINES OF EACH CLASS KEPT IN STOCK for SALE or HIRE, and ALL OUR MANUFACTURES GUARANTEED as to EFFICIENCY, MATERIAL, and WORKMANSHIP.

Parties are cautioned against using or purchasing imitations or infringements of these patent manufactures.
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OF

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AIR TUBING.

WORKS: COLLYHURST.

BOHLKEN'S Improved PATENT EARTH BORERS.



THE BEST TOOL FOR BORING HOLES in the GROUND, to any depth, supplied in large quantities to CONTRACTORS, RAILWAY COMPANIES, BUILDERS, DOCKYARDS, &c., in GERMANY, RUSSIA, AUSTRIA, and HUNGARY. All sizes, from 2 inches to 18 inches diameter, kept in stock by the Patentee,—

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70 and 71, BISHOPSGATE STREET WITHIN,
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THE DON ECONOMIC LUBRICATING OIL IS 40 PER CENT. CHEAPER THAN THE ORDINARY KINDS.



MR. ALFRED HEWLETT, of the Wigan Coal and Iron Company, says:—"I have used it for two years, and find it to answer exceedingly well for lubricating purposes."

MR. NASMYTH, the Inventor of the Steam-Hammer, says:—"I am highly pleased with it as a most effective and durable lubricant, having remarkable properties in the way of setting free bearings which had got set fast."

In face of these and hundreds of other letters to the same effect, it is a MERE WASTE OF MONEY to use the dearer kinds for the engines and machinery of collieries and mines, numbers of which are now using the Don Oil instead.

Any company desirous of trying it before adopting it may do so at our risk and expense. Circulars containing particulars sent on application.

PRICE—By the Ton of 253 Gallons, 2s. 6d. a gallon; by the Cask of 40 Gallons, 2s. 9d.

AGENTS WANTED AT HOME AND ABROAD.

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MANAGERS,

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CHAS. PRICE AND CO.'S RANGOON ENGINE OIL, AS SUPPLIED TO H.M. DOCKYARDS AND FLEET.



THIS OIL is suitable to every kind of Machinery. As a lubricant it is equal to the best Sperm or Lard Oil, while it possesses the great advantage of being entirely free from any principle which will corrode the metal bearings.

For particular kinds of Machinery, the Oil may be specially prepared of a consistency and character adapted to the nature of the work to be done.

"I herewith certify that the Rangoon Engine Oil, manufactured by Messrs. Chas. Price and Co., is free from any material which can produce corrosion of the metal work of machinery. It is indeed calculated to protect metallic surfaces from oxidation.

"The lubricating power of this oil is equal to Sperm or Lard Oil.

"T. W. KEATES, F.C.S., &c., &c.

Every parcel of the Oil sent from the work bears the Trade Mark of the Firm.

LONDON: CASTLE BAYNARD, UPPER THAMES STREET.

WORKS: MILLWALL, POPLAR; and ERITH, KENT.

TANGYE BROTHERS AND HOLMAN,

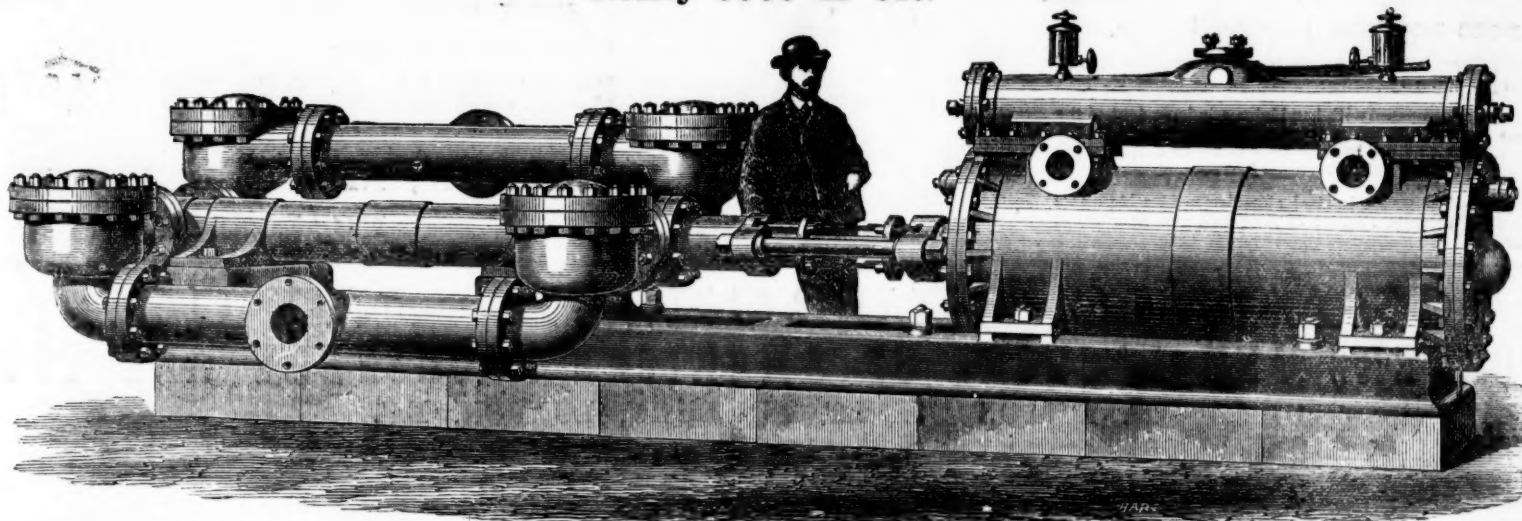
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CORNWALL WORKS (TANGYE BROTHERS), BIRMINGHAM,
NEWCASTLE-ON-TYNE (TANGYE BROTHERS AND RAKE), OFFICES AND WAREHOUSE, ST. NICHOLAS' BUILDINGS.
SOLE MAKERS OF

THE "SPECIAL" DIRECT-ACTING STEAM PUMPING ENGINES

FOR FORCING WATER FROM MINES.

Nearly 3000 in Use.



The "SPECIAL" Direct-acting Steam Pumping Engines require no costly Engine Houses or massive foundations, no repetition of Plunger Lifts, ponderous Connecting-rods, or complication of Pitwork, and allow a clear shaft for hauling purposes.

Extract from "ENGINEERING," September 6th, 1872:—

"The accompanying engraving illustrates a large specimen of the 'Special' Steam Pump, which was brought before the public about four years since by Messrs. Tangye Brothers and Holman. The Pump is the invention of Mr. S. Cameron, of New York, and since its introduction Messrs. Tangye have turned out nearly 3000 from their works.

"These pumps are of various sizes, and at first only small ones were made, but as their usefulness became developed the manufacturers designed pumping engines on the same principle for use in collieries. They were first applied to this purpose in the Newcastle collieries about three years since, and through the efforts of the late Mr. A. Stanfield Rake, under the direction of Messrs. Tangye, about 130 of these pumps had been introduced—principally in the collieries of the Durham and Newcastle districts, up to the end of 1870. They were adapted to perform the required duty—varying in almost every case—of forcing from 1000 to 10,000 gallons per hour from depths ranging from 100 to 500 ft. The success of this system of pumps led Mr. J. Bigland, the manager of Messrs. Pease's Bishop Auckland Collieries, to conclude that it was adapted for yet heavier work. The result of his investigations into its working led to the manufacture of the engine we have illustrated, for the Adelaide Collieries, belonging to Messrs. Pease, at Bishop Auckland.

"The construction of the Special Steam Pump is so well known

that we need now do no more than refer to the dimensions of the various parts. The steam cylinder is 26 in. diameter, and the pump—which is double acting—is 6½ in. diameter, with a 6-ft. stroke. The slide valve is steam-moved, and its alternate action is effected by means of two steel reversing valves, operated by the piston in the interior of the cylinder at either end. Hence there is no external mechanism except the piston rod, a few inches only of which is seen reciprocating between the stuffing boxes of the steam and pump cylinders. In the contract it was stipulated that the engine should raise 120 gallons per minute 1040 ft. high in a single lift, and this is more than accomplished, with apparently as much ease as if its load was delivered at only 100 ft. high.

"The engine-room at the Adelaide Collieries is situated at a depth of 1040 ft. below the surface, and is an arched chamber, about 100 ft. long by 20 ft. wide, and 10 ft. high at centre. At the far end of this chamber is a double-flued boiler, 27 ft. long and 7 ft. in diameter. Placed between the boiler and the shaft is the pumping engine we have been describing. It was started on June 6, 1871, and Mr. Bigland reported that, having measured its duty, he found the average of seven trials to be 137 gallons per minute, thus giving a higher duty than was stipulated for in the contract.

"A still larger Special Steam Pump than the one already described

has since been made by Messrs. Tangye for Messrs. Stannier's collieries, Silverdale, Staffordshire. The steam cylinder of this engine is 32 in. in diameter, and the water cylinder 10½ in.; the stroke 6 ft., and the engine has to raise 22,500 gallons per hour 540 ft. high. Two out of eight engines for some extensive coal mines in Germany are also in a forward state; each of these engines is to be capable of raising 150 gallons per minute, or 9000 gallons per hour, 750 ft. high. This system of underground pumping engine undoubtedly carries with it the recommendations of simplicity and great power with a small number of mechanical parts. Its first cost is also moderate, as compared with the method of raising water from great depths by a series of 40 or 50 ft. lifts. Its practical value was tested in 1867 by the award of a silver medal by the Royal Falmouth Polytechnic Society, which is composed chiefly of mining engineers. In fact, these engines appear to solve a very important commercial question in mining operations—viz., the most economical and effective means of deep mine drainage. Their success has been established in the coal mines of Durham and Newcastle, and there is reason why their adoption should not follow, as occasion requires in the copper and tin mines of Cornwall, some of which are of great depth; and especially for foreign mines, where transport convenience and economy are of paramount consideration."

The "Special" Steam Pumping Engines are in use at the following among many other Collieries:—

Adelaide Colliery, Bishop Auckland.....	3 Pumps.	North Bitchburn Colliery, Darlington.....	2 Pumps.	Stott, James and Company, Burslem	1 Pump.
Acomb Colliery, Hexham	1 "	Newton Cap Colliery, Darlington	1 "	Straker and Love, Brancepeth Colliery	1 "
Blackfell Colliery, Gateshead	1 "	Normanby Mines	1 "	Seaton Delaval Coal Colliery, near Newcastle	1 "
Black Boy Colliery, Gateshead	1 "	Oakenshaw Colliery	1 "	Thornley Colliery, Ferryhill	2 "
Castle Eden Colliery	2 "	Pease's West Colliery	2 "	Thompson, John, Gateshead	2 "
Carr, W. G., Newcastle.....	4 "	Pease, J. and J. W., near Crook	5 "	Trimdon Grange Colliery	1 "
Etherley Colliery	1 "	Pease, J. and J., Brandon Colliery	1 "	Tudhoe Colliery.....	4 "
Gidlow, T., Wigan	3 "	Pegswood Colliery, near Morpeth.....	2 "	Vobster and Mells Colliery.....	2 "
Haswell, Shotton and Easington Coal Company	3 "	Pelton Fell Colliery	1 "	Widdrington Colliery, Morpeth.....	5 "
Lochelly Iron and Coal Company	2 "	Railay Fell Colliery, Darlington	1 "	Whitworth and Spennymoor Colliery	5 "
Lochore and Capelrae Cannel Coal Company	6 "	Right Hon. Earl Durham, Fence Houses.....	1 "	Westerton Colliery, Bishop Auckland	1 "
Leather, J. T., near Leeds	2 "	Skelton Mines	1 "	Wartley Colliery, Gateshead	1 "
Lumley Colliery, Fence Houses.....	1 "	South Benwell Colliery	5 "	Westminster Brymbo Coal Company	2 "
Monkwearmouth Colliery, Sunderland	1 "	St. Helens (Tindale) Colliery.....	1 "	Weardale Coal and Iron Company	5 "

PARTICULARS OF THE "SPECIAL" STEAM PUMPING ENGINES SUITABLE FOR HIGH LIFTS IN MINES.

Diameter of Steam Cylinder	6	8	10	8	12	16	10	14	18	21	14	18	21	26	16	21	24
Diameter of Water Cylinder	3	3	3	4	4	4	5	5	5	5	6	6	6	6	7	7	7
Length of Stroke	24	24	36	24	36	48	24	36	36	48	36	36	48	72	36	48	48
Strokes per minute	30	30	20	30	20	15	30	20	20	15	20	20	15	10	20	15	15
Gallons per hour	2,200	2,200	2,200	3,900	3,900	3,900	6,100	6,100	6,100	6,100	8,800	8,800	8,800	8,800	11,900	11,900	11,900
Height in feet to which water can be raised with 40 lbs. pressure per square inch of steam at pump	240	425	665	240	540	960	240	470	775	1,058	330	540	740	1,140	312	540	700
Diameter of Suction and Delivery	2	2	2	3	3	3	3½	3½	3½	3½	4	4	4	4	5	5	5
Diameter of Steam Inlet	¾	1½	1½	1½	2½	2½	1½	2½	3	3½	2½	3	3½	4	2½	3½	3½
Diameter of Exhaust	1	1½	1½	1½	2½	3	1½	2½	3½	4	2½	3½	4	5	3	4	4

PARTICULARS, &c.—Continued.

Diameter of Steam Cylinder	30	18	24	30	32	18	24	30	36	21	30	36	42	26	36	44	50
Diameter of Water Cylinder	7	8	8	8	8	9	9	9	9	10	10	10	10	12	12	12	12
Length of Stroke	72	36	48	72	72	36	48	48	72	48	72	72	72	48	72	72	72
Strokes per minute	10	20	15	10	10	20	15	15	10	15	10	10	10	15	10	10	10
Gallons per hour	11,900	15,660	15,660	15,660	15,660	19,800	19,800	19,800	19,800	24,400	24,400	24,400	24,400	35,240	35,240	35,240	35,240
Height in feet to which water can be raised with 40 lbs. pressure per square inch of steam at pump	1,100	300	540	840	960	240	427	665	960	264	540	780	1,062	282	540	800	1,040
Diameter of Suction and Delivery	5	6	6	6	6	7	7	7	7	8	8	8	8	10	10	10	10
Diameter of Steam Inlet	5	3	4	5	5½	3	4	5	6	3½	5	6	7	4	6	8	8
Diameter of Exhaust	6	3½	5	6	6½	3½	5	6	7	4	6	7	8	5	7	9	9

PRICES OF THE ABOVE ON APPLICATION.

Any combination can be made between the Steam and Water Cylinders, to suit Height of Lift and Pressure of Steam.

TANGYE BROTHERS & HOLMAN, 10, Laurence Pountney Lane, London, E.C.